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Skeptical Inquirer

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MARTIN GARDNER

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Should Chiropractors Treat Children?

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From the Editor

Martin Gardner and the Skeptical Movement Today

Martin Gardner's passing and the latest successful skeptic's conference are both causes for reflection on where the skeptical movement Gardner helped found stands now.

I begin these comments as I depart The Amazing Meeting 8 (TAM8), the James Randi Educational Foundation's big skeptics conference in Las Vegas. Martin Gardner's legacy was much in evidence, and indeed Gardner received a moving tribute from Randi at the beginning of a late-afternoon panel on the origin of the skeptics movement. Randi, Ray Hyman, and Paul Kurtz—three giants who, with Gardner, were present at the beginning—and I talked about the events that led to the creation of CSICOP (now our Committee for Skeptical Inquiry) in 1976. Ray's, Randi's, and Paul's reminiscences also lead off this special Martin Gardner Tribute Issue of the SKEPTICAL INQUIRER, pp. 28–42. Many other colleagues and I also contribute, and we've added a small taste of Martin's writings.

Back when Martin Gardner was writing his groundbreaking *Fads and Fallacies in the Name of Science*, he was a lone voice exposing pseudoscientists and their foibles. But in the 1970s he was joined by Randi, Hyman, and a few others. Soon Paul Kurtz, with his organizational genius, had them (and fifty other scholars and investigators) assembled as our Committee for the Scientific Investigation of Claims of the Paranormal (CSICOP, now CSI). Paranormal claims were rampant, and voices representing scientific thinking were much needed.

D.J. Grothe

Hyman, Kurtz, Randi, and Frazier at TAM8.

From that single centralized group, the modern skeptics movement was born. The movement, has proliferated and is now much more diverse. Groups, publications, Web sites, podcasts, blogs, and innovative programs have spread across the planet. Some of the participants are well aware of how it all started; others came independently and are just doing their own thing. The Amazing Meeting seemed to be the chance for everyone to come together. Thirteen hundred people showed up and packed a huge ballroom devoted to all the sessions. CSI, for the first time, was a co-sponsor of the event, along with the Skeptics Society.

Women are now much more a part of the scene, which is a very welcome improvement. At a panel on women and skepticism, six prominent women skeptics (Ginger Campbell, Pamela Gay, Harriet Hall, Jennifer Michael Hecht, Carol Tavris, and Rebecca Watson) pondered this topic and welcomed the significant proportion of females in the audience. All audiences were younger than usual, too—another welcome sign. Just as new generations of students need to be educated, new generations of skeptics are learning the ropes, with many already hard at work, much of which is excellent. Skeptical inquiry is not only important, it is fun, and that aspect draws in even more people. All this is refreshing. We need all these talented, diverse people. That's because the venues for uncritical promulgation of unsupported claims have likewise proliferated as endless cable TV channels and constantly multiplying new electronic media.

Some criticism at the conference was directed at fellow skeptics. Such self-criticism is another healthy sign. Astronomer Phil Plait gave heartfelt warnings for skeptics to be careful of their tone if they want to be effective. Philosopher/biologist Massimo Pigliucci spoke out against skeptics who allow their ideology to trump objective science and argued that one of skepticism's roles is to support good science, not undermine it.

Martin Gardner didn't go to conferences, but I think he would have liked this one. He would have enjoyed seeing a movement he inspired be so alive, vital, robust, and mature—while appealing to and drawing in motivated new generations.

—KENDRICK FRAZIER

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Study Links Carbon Dioxide to Near-Death Experiences

According to a new study published in the April 8, 2010, issue of the medical journal *Critical Care* ("The Effect of Carbon Dioxide on Near-Death Experiences in Out-of-Hospital Cardiac Arrest Survivors: A Prospective Observational Study"), people who have elevated levels of carbon dioxide in their blood report having experiences identical to near-death experiences.

The study examined fifty-two heart attack patients in three large hospitals. Of those, eleven reported experiences such as moving toward a bright light, feelings of peace and joy, and profoundly spiritual moments. Studies suggest that between one in four and one in ten heart attack survivors report having such experiences.

The exact cause has remained a mystery, but the new study provides a clue. Heart attacks occur when the supply of blood (and therefore oxygen) is blocked from the heart. The heart stops circulating blood, and as a result, the brain is deprived of oxygen. This in turn can increase carbon dioxide in the blood. Carbon dioxide is toxic in high concentrations, starting at about 1 percent of the inhaled air (10,000 parts per million). Pain-killing endorphins are released in response to the stress of the heart attack, and they dull the pain and can cause elation or hallucinations.

The link between oxygen deprivation in the brain and near-death experience has been suggested for many years. British researcher Susan Blackmore, author of *Dying to Live: Near-Death Experiences*, notes that many characteristics of typical near-death experiences (such as euphoria and the feeling of moving toward a white light) are also symptoms of oxygen deprivation. In fact, several substances have been found to cause near-death or out-of-body experiences, including ketamine (a hallucinogen similar to PCP that is used mainly as an anesthetic).

Though many believe that near-death experiences provide evidence of life after death, the fact that such experiences can be chemically induced points to a natural—instead of supernatural—cause.

—Benjamin Radford

Benjamin Radford is managing editor of the Skeptical Inquirer *and author of the new book* Scientific Paranormal Investigation: How to Solve Unexplained Mysteries. *His Web site is at www.radfordbooks.com.*

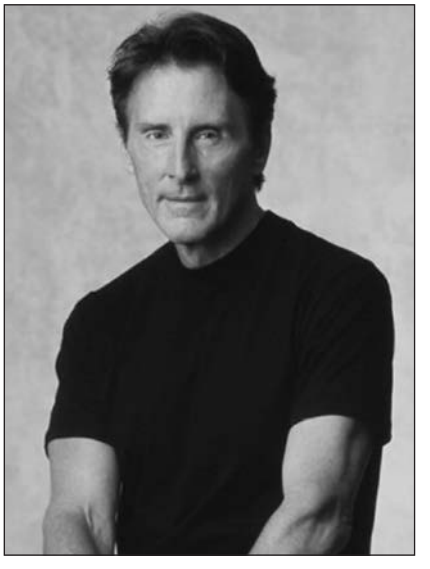
Alternative Medicine Guru Nearly Killed by Own Supplements

Health guru Gary Null, nutrition author and marketer of dietary supplements, including Gary Null's Ultimate Power Meal, filed a lawsuit against a manufacturer because he claims that he nearly died after taking his own supplements.

Null claims that after consuming two doses of his Ultimate Power Meal each day for a month as directed, he experienced severe kidney damage, "excruciating fatigue along with bodily pain," and bleeding "within his feet." Null claims that the manufacturer, Triarco Industries, put 1,000 times the correct dose of Vitamin D in his product. According to Null's attorney, at least a half-dozen other consumers also became sick from the tainted supplement.

Alternative medicines, herbal remedies, and dietary supplements are not regulated by the Food and Drug Administration because they are not marketed as drugs. According to the Dietary Supplement Health and Education Act of 1994, "The dietary supplement manufacturer is responsible for ensuring that a dietary supplement is safe before it is marketed. . . . Manufacturers must make sure that product label information is truthful and not misleading."

Indeed, there is no requirement that these substances be scientifically tested for safety or efficacy, and many have been proven ineffective for the conditions for which they are used. Supplements often contain doses and ingredients wildly different than what is indicated on their labels, as this case demonstrates. The vitamin and herbal supplement industry, a multi-billion-dollar business, has lobbied hard to keep its products from being regulated by the FDA. As a result, the FDA can step in only when something goes wrong, such as after people have been injured or killed by natural herbs. That happened in 2004, when the FDA banned ephedra, an herbal remedy used in traditional Chinese medicine for thousands of years. Millions of consumers took the herb on the belief that it was natural, safe, and effective—until the supplement was linked to over one hundred deaths.



Ironically, Null and his customers would likely not have been poisoned if his products were held to the same standards and regulations that pharmaceuticals are subjected to—and which Null and others in the "alt med" industry have long rejected.

—Benjamin Radford

What's New? Observations on Science and Fringe Science from Bob Park

Cell Phones: Lawyers May Be Planning a Mass Tort Blitz

On June 15 the San Francisco Board of Supervisors voted 10–1 to require retailers to post the "specific absorption rate" (SAR) of cell phones. Others will follow. The story began in 1988 when David Reynard gave his wife, Susan, a cell phone. She died of brain cancer four years later; as David explained on *Larry King Live*, "she held it against her head and talked on it all the time" (*What's New*, January 29, 1993). With such compelling evidence, David Reynard sued the cell phone industry. Confronted with pseudoscience, the first question is: who profits by this? With an estimated five billion cell phones in use, it's fertile soil for a "mass tort blitz," the dream of every tort lawyer. As in the asbestos and tobacco industries, some companies face so many lawsuits that it becomes cheaper to settle than to defend. (June 18)

Cell Phones: The High Cost of Scientific Ignorance

An opportunity to explain one of the simplest and most powerful concepts of science to the public is slipping away. A month ago the World Health Organization (WHO) released its long-awaited Interphone study of cell phones and brain cancer in thirteen countries. The ten-year, $14 million, case-control study reports that "no increase in risk of glioma or meningioma was observed with the use of mobile phones." That's the right answer, so what's the problem? We already knew that cell phones don't cause cancer. We've known it for years. From the media coverage, you would think these guys just discovered it. Let's go to the next sentence: "There were suggestions of an increased risk of glioma at higher exposure levels, but biases and error prevented a causal interpretation." So is there a supernatural interpretation? That one sentence undoes everything in the study. Case control requires human recollection; at their best, case-control studies are to science as polls are to elections. They may come out the same, but you can't count on it. (June 25)

Conservation of Energy: Yes, Biology Must Also Obey the Law

Ten years ago a group in Denmark published a beautiful epidemiological study of cell phones and brain cancer in the *Journal of the National Cancer Institute* (*JNCI*) (Johansen, C., Boice, J.D., Jr., McLaughlin, J.K., Olsen, J.H. Cellular Telephones and Cancer—A Nationwide Cohort Study in Denmark. *JNCI* 93 [2001]: 2037). The study was based entirely on existing public records: the Danish Cancer Registry, mobile phone charges, death records, subscriptions, etc. The conclusion was unequivocal: there is no correlation between cell phone use and the incidence of brain cancer.

It was nice to have that fact confirmed, but it was not a surprise. I was invited to write an editorial on how scientists should respond to the cell phone/brain cancer question for the same issue of *JNCI*. Cancer agents act by creating mutant strands of DNA. In the case of electromagnetic radiation, there is a sharp threshold for this process at the extreme blue end of the visible spectrum. Albert Einstein explained this with the photoelectric effect in 1905, for which he received the Nobel Prize in 1921. Cell phones operate at a frequency about one million times lower than the ultraviolet threshold and hence cannot be a cause of cancer. It's important to recognize that the frequency, not the intensity, of radiation makes it a cancer agent. (June 25) (For more on the cell phone scare, see the September/October 2009 issue of the SKEPTICAL INQUIRER.)

COSMOS: An Acronym I Am at Present Unable to Decipher

The WHO study that prompted the board's decision seemed to settle nothing. Indeed, even as the non-results were announced, still another mobile phone study, the COSMOS cohort study of health effects in five European countries, to be carried out at Imperial College London over a period of thirty years, was announced. It must be a joke; in thirty years the technology will be completely different. (June 18)

Fake Bomb Detector: The High Cost of Ignorance

According to a story in *The Independent* (U.K.) on June 8, the investigation into the sale of fake bomb detectors has been expanded to a number of firms in the U.K. That golfers were buying fraudulent golf-ball finders seemed comical fourteen years ago. The Quadro Tracker was nothing but an "antenna" mounted on a pistol grip with a swivel that was free to rotate 360 degrees. An almost imperceptible deviation of the swivel from horizontal would cause the antenna to rotate under the force of gravity to its lowest point. To a credulous observer it might seem to be controlled by some mysterious external force. Quadro soon began marketing the tracker to law enforcement agencies and the Department of Defense for $995 each to search for drugs and weapons.

But it failed a simple scientific test. Sandia National Labs took one apart and found it contained no internal parts. The

FBI shut Quadro down and arrested its officers (*What's New*, January 26, 1996). However, the device soon reappeared in the U.K. as the ADE 651, sold by ATSC for prices as high as $48,000. At least 1,500 were sold to the government of Iraq as bomb detectors at a cost of millions of dollars, as *What's New* reported in January (*What's New*, January 29, 2010). The fake bomb detectors have reportedly contributed to hundreds of bomb deaths in Iraq and Afghanistan, including British and American troops. (June 11) (For more on fake bomb detectors, see SI News and Comment, May/June 2010.)

Magical Thinking: Dowsing Is Not Illegal in the U.S. or the U.K.

In spite of the heinous nature of the ATSC crime, it may be difficult to obtain a conviction. The defense of those charged with selling fake bomb detectors will be that they believe the devices work. Their defense will point to the hundreds or thousands of people who openly market their services to dowse for water or other substances. Sometimes called water-witching, dowsing is said to rely on supernatural influence over the muscles of the person holding a willow fork or an ADE 651. Dowsing doesn't always work, but what does? The prosecution will find itself hip deep in arguments over how an ADE 651 differs from prayer. Magical thinking will be with us until children are taught that observable effects result only from physical causes, and they must be taught at the time they are learning their first language. (June 11)

Lies: The Animal That Talks Often Tells Lies

The polygraph can't tell a lie from the sex act. But four years ago we predicted that functional magnetic resonance imaging (fMRI) might (*What's New*, June 23, 2006). The defendant in a Tennessee court case sought to use fMRI to demonstrate his veracity. The judge did not allow it. Good! The only thing worse than a lie detector that doesn't work is one that does. It would be the ultimate invasion of privacy. (June 11)

Nativis Inc.: Haunted by the Ghost of Jacques Benveniste

A start-up in La Jolla, California, expects to transform the way medicine is delivered. The company says it's based on the work of several Nobel physicists including Paul Dirac and Richard Feynman. A video of Feynman giving a talk on quantum electrodynamics (QED) is posted on its Web site. Based on QED, Nativis claims pharmaceuticals have electromagnetic signatures that convey the same effect as the drug itself. It's homeopathy done backwards. Homeopathy starts with medicine and dilutes it sequentially until it's just water. Nativis, by contrast, starts with pure water and exposes it to very-low-frequency electromagnetic radiation, which of course does nothing at all to the water. However, Nativis is convinced that the ordinary water will now behave like medicine. This is lunacy, and not even original lunacy.

In 1988 Jacques Benveniste, a French biochemist, convinced himself that water can be made homeopathic by exposing it to low-frequency electromagnetic waves. I challenged him publicly in the May 17, 1999, issue of *Time* magazine to an intercontinental test involving an exchange of samples. Benveniste agreed but said he needed a little time. Weeks grew into months. Months into years. He died five years later without completing the test. I think I know why. Homeopaths see ordinary water and convince themselves it's magic water. Nativis must do the same. (June 4)

Acupuncture: Gimpy Mice Bamboozle *Nature* Magazine

A team at Rochester University led by neuroscientist Maiken Nedergaard studied the production of adenosine when pain is inflicted on the hind paw of a mouse. Adenosine is a neuromodulator that reduces pain. If the mouse is then stuck with an acupuncture needle, the production of adenosine persists for a longer time. I suppose it might last longer still if the mouse's tail is pulled. Nedergaard says her study may open the way to making acupuncture more effective. Even Daniel Cressy, writing in *Nature*, said the study "makes acupuncture seem less alternative," but I can't see how. The acupuncture needle was inserted just below the knee in the Zusanli point, which is supposedly for the stomach, not paws. This study does nothing to answer the basic scientific questions: what is the evidence for the meridians or the mysterious qi, and how are acupuncture points determined? Pressed on these points, acupuncturists fall back on the *Yellow Emperor's Classic of Internal Medicine*, but that book is at least 2,000 years old. No matter—they freelance a lot. (June 4)

Jesus Statue: Gaze on My Works Ye Mighty and Despair

A familiar landmark in southwestern Ohio, the six-story statue of Jesus from the torso up, was nicknamed Touchdown Jesus because the arms were raised like a referee signaling a touchdown. Constructed of plastic foam over a steel frame, it was consumed by fire after being struck by lightning, as if to invite comparison. (June 18)

—Robert L. Park

Robert L. Park is professor of physics at the University of Maryland and author of Voodoo Science and Superstition. *He is a Committee for Skeptical Inquiry fellow. These items are from his weekly* What's New *electronic newsletter (archives at www.bobpark.org). E-mail: bobpark@umd.edu.*

Illusionists at Work

How to 'Prove' That Bogus Treatments Are Effective

EDZARD ERNST

It is not difficult to set up experiments that seemingly "prove" that bogus treatments work. Health journalists, in particular, are regularly taken in by such bogus studies, and the misleading results are subsequently reported in the press, perpetuating the public's belief in these treatments.

I will give several examples from the realm of "alternative" medicine. They are, of course, entirely fictitious. Not that there is a shortage of real ones, but these days one has to be careful not to end up in the hands of libel lawyers (see "Keep Libel Out of Science," SI, May/June 2010).

Bogus Experiment No. 1

Most clinical trials test whether one treatment is better than another. These studies are called "superiority trials." Other studies are aimed at testing whether one therapy is as effective as another. They are called "equivalence trials." My first example is an equivalence trial comparing a highly dilute homeopathic remedy with an accepted and well-known drug, say paracetamol (known in the U.S. as acetaminophen). Take two hundred patients with a sprained ankle and randomize them to take homeopathic arnica (the experimental treatment) or paracetamol (the control treatment). One or two days later, measure the swelling of the injured ankle as an undeniably objective outcome measure. The results will show that the swelling diminished in both groups and that no difference between the two groups emerged. The conclusion, therefore, is that both are equally effective; however, homeopathy (not having any actual active ingredient) caused fewer adverse events. The headline in the papers might read: "Homeopathy Better than Paracetamol."

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The trick here is to select an outcome measure that is not affected by the "accepted and well-known" drug. Paracetamol does not reduce swelling, and few people would claim otherwise. Thus, it acts as a placebo. Comparing two different placebos should always result in equivalence. Yet the illusion can be quite convincing.

Bogus Experiment No. 2

My second fictitious study is also an equivalence trial. It compares homeopathic care against conventional medicine for a serious chronic condition, say Crohn's disease. Twenty patients are randomized to be treated with either approach. The results demonstrate that the carefully chosen endpoint (e.g., a symptom score) reveals no differences between the groups. The conclusion: homeopathy is as effective as standard treatment of Crohn's disease. The headline this time? "Homeopathy Scientifically Proven to Work for Life-Threatening Diseases."

The trick here is to underpower the study dramatically. Underpowered equivalence trials will tend to (falsely) suggest equivalence between the two tested approaches—a safe bet for illusionists.

Bogus Experiment No. 3

Another approach is to conduct a "pragmatic" trial. Such studies are currently very popular because, according to their proponents, they best reflect the "real life" situation of clinical practice. In this trial, chronically ill patients are randomized to receive either standard care (the control group) or standard care plus homeopathy (the experimental group). The primary measure of outcome for that study could be patient satisfaction, well-being, quality of life, or some other subjective endpoint. Due to the regular, lengthy, empathetic encounters received by the latter group, patients are bound to feel better and improve. Illusionists

will then interpret this benefit as being caused by the specific effects of the homeopathic remedies. The headline: "Homeopathy Proven to Help Chronically Ill Patients."

The trick, in this case, is that A (standard care) plus B (homeopathy) is always more than A alone (A < A + B)—unless, of course, B is zero. But an empathetic encounter does, of course, have an impact on many subjective outcome measures. If, in clinical trials, we do not control for nonspecific effects, it is always easy to make a treatment look effective, even in a randomized trial.

Bogus Experiment No. 4

My last illusionists' stunt is an animal study. Such experiments, it is often (falsely) claimed, are not affected by placebo effects. Ten experimental rats receive a diet to which either a homeopathic product or a placebo is added. The aim here is not to test for therapeutic effects but to find out whether homeopathy can cause a biological effect in principle. All conceivable types of bias and confounding are excluded. The study can be designed to be completely watertight. The rats receive the treatments and are observed for several weeks. At the end of this period, all rats in the homeopathy group have died, but all of the control animals are alive. The conclusion: homeopathy generates biological effects and is thus different from placebo. The headline: "Animal Experiments Prove the Principles of Homeopathy."

The trick is simple: we need only to select the right "remedy" (and "hide" this in the small print of the experiment). For my fictitious experiment, I chose a "mothertincture" of arsenic. This is pure, undiluted, and very toxic arsenic, yet it is strictly speaking a homeopathic preparation.

The conclusion? Bogus experiments are not difficult to set up, and it is not difficult to fool uncritical people with their results. But they are still only tricks of illusionists who aim to mislead us. It follows that, if we fail to apply our skills of critical assessment or, worse still, we never had such skills, illusionists pretending to be scientists can be a menace. □

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Swedenborg and Dr. Oz

Born in Cleveland to Turkish immigrants and raised a secular Muslim, Dr. Mehmet Cengiz Oz is vice-chair and professor of surgery at Columbia University. Thanks to his many appearances on *The Oprah Winfrey Show*, and now with his own Oprah-sponsored *The Dr. Oz Show*, he has suddenly become the nation's most famous heart surgeon. Each year he performs more than three hundred cardiac operations at NewYork-Presbyterian Hospital in Manhattan. His speaking fee is $100,000. Author of hundreds of technical papers and a series of *YOU* books—the most recent is *YOU: Having a Baby*—his admirers are now in the millions.

It is not widely known that Oz has been profoundly influenced by Emanuel Swedenborg, a Swedish Protestant fundamentalist who, late in life, became a spiritualist and Sweden's most famous trance medium. In the November/December 2007 issue of *Spirituality and Health*, a glossy bimonthly devoted to New Age topics, Oz coauthored an article titled "Mehmet Oz Finds His Teacher," about how his wife Lisa introduced him to the theology of Swedenborg. (Lisa, by the way, is a Reiki Master. Reiki is a Japanese form of alternative medicine developed by a Buddhist monk.)

Once greatly admired by thinkers as diverse as Emerson, Goethe, Blake, William James's father, and John Chapman—better known as Johnny Appleseed—Swedenborg is now almost forgotten except for a small cult following. Here is a thumbnail biography.

Emanuel Swedenborg (1688–1772) was a respected Swedish scientist until middle age, when Jesus appeared to him in a vision. The Lord persuaded him to abandon science and devote the rest of his life to theology. After Swedenborg's death, his followers in England founded The Church of the New Jerusalem based on his fifty or so books. Remnants of this church still flourish in England and in the United States, where Swedenborgians number an estimated 6,000.

Swedenborg never doubted that every verse in the Bible was God inspired. His deviations from orthodoxy resulted from endless trances that today would be called OBEs (out-of-body experiences). Among his many books, the most popular by far was *Heaven and Hell*. Swedenborg claimed to have visited both regions in his trances, where he supposedly spoke with angels, devils, and spirits of the departed. His book contains detailed descriptions of heaven and hell.

All of Swedenborg's books were written in Latin. A series titled *Heavenly Secrets* consists of eight volumes. Although he never married, *Conjugal Love* was a widely read treatise. Another popular book, *Apocalypse Revealed*, is a verse-by-verse analysis of the Bible's Book of Revelation.

Swedenborg's most worthless book, *Life on Other Worlds*, contains—fasten your seatbelt!—detailed accounts of his out-of-body travels to the five then-known planets, the Moon, and five planets outside the solar system. On each of these worlds he was able to chat with the human inhabitants and the bodiless spirits of deceased humans who serve the inhabitants. He also visited the heavens and hells of some worlds, where he spoke with humans who became angels and humans evil enough to become demons. Some of these trips "lasted a day," he writes, "others a week, and yet others for months."

Swedenborg's first visit was to Mercury. Its spirits were able to invade his brain, searching for facts and knowledge but having no interest in ideas or opinions. The most notable spirit he meets is none other than Aristotle. We are told he was a wise man in contrast to his many "foolish" Earth followers.

The human inhabitants of Mercury are slimmer than earthlings. Their women have smaller faces. Their clothes are tight fitting. In spite of Mercury's nearness to the sun, its atmosphere shields the planet from the sun's heat, producing a climate "not too hot or too cold."

Swedenborg then visits Jupiter. Its land is called "fertile." (Swedenborg had no way of knowing that Jupiter *has no land*.) Its inhabitants' main concern is bringing up their children, whom they dearly love. They are free of all evil impulses, such as stealing and greater crimes. They know nothing of wars but

Martin Gardner submitted this column May 12, 2010, ten days before his death. See tributes in this issue.

are a "gentle and sweet" people who live in a state of "blessedness" and "inner happiness." Their clothing is made of "bluish bark or cork." When they sit down to eat they do not use chairs or benches but instead sit on piles of fig leaves. Their horses resemble ours, only smaller.

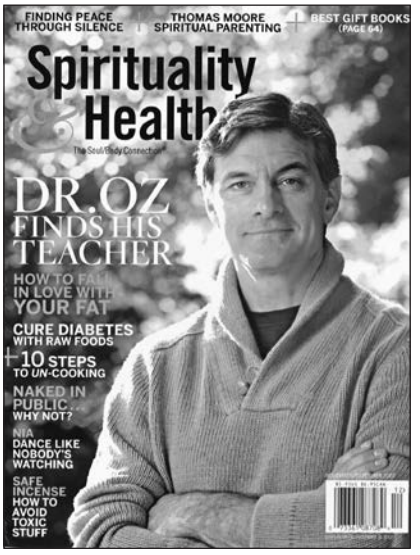
> I was further informed by the spirits from that world about various matters concerning its inhabitants, such as their way of moving, and their food and houses. When moving, they do not walk upright like the inhabitants of this and many other worlds; nor do they go on all fours like animals, but when they walk they help themselves with the flat of their hands, at every other pace half rising to their feet. As they move, at every third pace they turn their faces to one side and look behind them, making a slight twist, quickly accomplished, of the body. This is because they think it impolite to be seen by others except face to face.

I spare the reader Swedenborg's accounts of the inhabitants and spirits on Mars and Saturn. Venus is more interesting because its humans are of two kinds: one "gentle" and "humane," the other as fierce as wild animals. The two groups, along with their spirits, live on opposite sides of Venus. Their heavens and hells are nearby.

Swedenborg devotes only three pages to the spirits and inhabitants of the Moon. The humans are small as dwarfs, but when they speak, their voices—which come from their abdomens—roar like thunder. Swedenborg assures us that the moons of other solar-system planets are also inhabited by humans and their spirits, but he gives no details. His trip to our moon is followed by visits to five planets in what he calls our "starry sky," far beyond our sun.

I should add that the humans on our planets all worship Jesus, although he was incarnated only on Earth. Swedenborg devotes a chapter to explaining why Jesus chose our world as a place to live as a man and die for our salvation. In other writings Swedenborg claims that the Lord's Second Coming, and the judgment of who is to be saved and who is not, actually took place in our heaven in 1757. (He was convinced, by the way, that faith in Jesus is insufficient for escaping hell. That faith must be combined with charity, or good works.)

If you are interested in reading *Life on Other Worlds*, a paperback translation titled *Life on Other Planets* was published in 2006 by the Swedenborg Foundation in West Chester, Pennsylvania, and the Swedenborg Society in London. Copies are readily available on the Internet.


FINDING PEACE THROUGH SILENCE
THOMAS MOORE SPIRITUAL PARENTING
BEST GIFT BOOKS (PAGE 64)
Spirituality & Health
DR. OZ FINDS HIS TEACHER
HOW TO FALL IN LOVE WITH YOUR FAT
CURE DIABETES WITH RAW FOODS
+10 STEPS TO UN-COOKING
NAKED IN PUBLIC... WHY NOT?
NIA DANCE LIKE NOBODY'S WATCHING
SAFE INCENSE HOW TO AVOID TOXIC STUFF

The book contains a lengthy introduction by Raymond Moody, author of many books about NDEs (near death experiences) of persons whose hearts momentarily stopped beating and who had visions of entering heaven, sometimes even seeing Jesus. Moody believes NDEs are genuine out-of-body events similar to Swedenborg's trances. He strives mightily, without success, to find something of lasting merit in Swedenborg's crazy book.

Now for Dr. Oz's fascination with Swedenborg's other, saner writings.

"When Lisa and I got married," he writes in *Spirituality and Health*, "there was no 'til death do us part in the ceremony." Swedenborg had convinced Oz and Lisa that marriages are intended to last forever in paradise.

"After death the veil that separates the spiritual from the material world is lifted," Oz goes on, "and we continue in our true selves—either as angels or evil spirits, depending on whether we have internally made a heaven or hell for ourselves while living here." Angels, as described by Swedenborg, "are not a separate species, but people who are regenerate—literally reborn humans." This, of course, is contrary to what the Bible says about angels and demons.

Swedenborgism, Oz believes, is close to Buddhism. "Zen Master D.T. Sesuki," Oz writes, "once referred to Swedenborg as 'the Buddha of the North.'" A devout Christian, Swedenborg would have violently disagreed.

The number of alternative medicines that Oz favors is not known. He believes, contrary to most doctors, that acupuncture really works, that its effect on pain is more than a placebo. Acupuncture should always be supplemented, says Oz, by what he calls the Dr. Oz Diet to lose weight. On an episode of *The Oprah Winfrey Show* Oz supervised an acupuncture treatment for a pain in Oprah's shoulder. Oprah said she could hardly feel the needles and that the pain had vanished after the treatment. In the April 2010 issue of *O*, Oprah's magazine, Oz's daughter Daphne authored an article on "The Secrets of Acupuncture."

It is hard to believe, but Oz also recommends homeopathy! Homeopaths are convinced that the more dilute a drug, the more potent it is. Accordingly, they dilute their medications until only a few or no molecules remain. Somehow, in a way totally unknown to science, the dilutant "remembers" the missing molecules! Mainstream doctors like to tell of the homeopath who forgot to take his daily pill and died of an overdose.

In the November 2009 issue of *O*, Oz recommended homeopathy for treating migraines. "Acupuncture and homeopathy are worth considering," he wrote, "as adjunct therapies once you are sure the headache is not a sign of a serious disorder."

Ophthalmologists all agree that eye refraction problems, such as near- and far-sightedness and astigmatism, can be relieved only by corrective lenses or eye surgery. Oz thinks otherwise; search Google for "Dr. Oz, eye exercises." Also search on Oz and acupuncture, homeopathy, remedies, and cancer.

Oz is a fine cardiac surgeon. Unlike the Wizard of Oz, he is not a humbug, but one should be wary of his far-out medical advice. □

Nostradamus: A New Look at an Old Seer

Nostradamus, history's most famous prophesier, continues to fascinate. Claims that he foresaw the rise of Napoleon and of Hitler, among other world events, are being supplemented by assertions that he divined the terrorist strikes of September 11, 2001, and the end-times brouhaha over 2012.

I have taken a fresh look at several of his more famous quatrains, translating them from sixteenth-century French into rhymed English verses—no easy task!

Background

Mìchele de Notre-Dame (1503–1566), better known by the Latinized *Nostradamus*, was a French physician and astrologer who has been variously described as a scholar, a sorcerer, and a fraud. He became wealthy and honored, especially at the French court where Henry II's queen, Catherine de Medìci (1519–1589), was a patron of astrologers and sorcerers.

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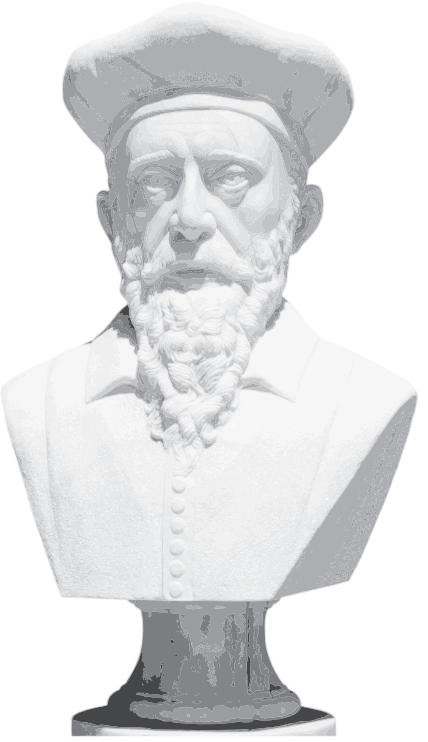

Nostradamus's major work was a collection of quatrains (four-line rhyming verses) numbering one thousand and arranged in groups of a hundred called *centuries*. The first 353 quatrains were published in 1555 as *Les Prophéties de M. Michel Nostradamus*, and they were followed by other volumes. The verses' vague, symbolic language meant that they could be interpreted in different ways in different times, and—by a process known as *retrofitting* (after-the-fact matching)—an event could in hindsight look as if it had been predicted by the supposed seer.

It is sometimes said that Nostradamus wrote in "Old French" (Stray 2009, 264), but that term is reserved for the French language of the ninth to fourteenth centuries. Nostradamus actually wrote in Middle French, which was used in the fifteenth and sixteenth centuries. (Modern French has been used from the seventeenth century to the present. See *Encyclopedia Britannica* 1960, s.v. "French Language.") Nostradamus's quatrain lines have ten syllables each and a mid-line pause, or *caesura*, for rhetorical effect. The lines rhyme ABAB. The constraints of this poetic form caused him to engage in various verbal strategies, such as using compressed language, even abbreviations.

Translating Nostradamus is difficult at best, and one who would translate into verse must—like the original versifier—make things fit. I have tried to follow Nostradamus's word choice when possible, but out of necessity I have

occasionally used synonyms, altered the syntax, and made other modifications—including sometimes settling for near rhyme rather than full rhyme.

The Quatrains

Here are ten of Nostradamus's most significant quatrains first given in the original Middle French and then recast into modern English verse and discussed.

1. The Death of King Henry II. One of Nostradamus's most famous prophecies—number I:35—is also "the verse that made his reputation" (LeVert 1979, 67):

Le lyon ieune le vieux surmontera,
En champ bellique par singulier duelle,
Dans caige d'or les yeux luy creuera:
Deux classes vne, puis mourir, mort cruelle.

My translation:

The young lion shall overcome the old,
On field of battle by single duel;
He'll smash his eyes with a casing of gold:
Two fleets one, then to die, a death cruel.

Published in 1555, this verse is said to predict the accidental death of King Henry II, the quatrain's "old lion." Reportedly, during a French jousting tournament in 1559, a splinter of a broken lance went through the visor of the King's golden helmet (Nostradamus's "cage of gold") and thence through his eye into his brain. He subsequently suffered and died "a cruel death" (Roberts 1949, 20).

Alas, the quatrain was clearly not intended to refer to Henry. Just three years after publishing it, in mid-1558, Nostradamus penned a letter to the king, saying that he expected him to live a long life and predicting wonderful things in his future. Moreover, a tournament is not a "field of battle"; the verse refers to "eyes," plural; and there is no known precedent for a golden helmet (gold is a soft metal), certainly not in the case of Henry (Randi 1993, 175). So Nostradamians are simply retrofitting, attempting to adapt later events to the French seer's murky statements. The same is true of the word *classes*—interpreted by some Nostradamians as "wounds" (from Greek *klasis*).[1] (It may mean "classes" or "knells" or—if the word is really the Latin *classis*—"fleets.") The sense of the verse is that an old leader is slain by a younger one, thus unifying their forces.

2. The Coming of Napoleon. A rather typical Nostradamus quatrain, number I:60, illustrates how very different interpretations can be drawn from a single cryptic verse. Nostradamus (1555) wrote:

Vn Empereur naistra pres d'Italie,
Qui a l'Empire sera vendu bien cher,
Diront auecques quels gens il se ralie
Qu'on trouuera moins prince que boucher.

I translate the rather plain text of quatrain I:60 as follows:

A ruler will be born near Italy,
Whose cost to the Empire shall be quite dear;
They will say from those whom he shall rally
That he is less a prince than a butcher.

The phrase "near Italy" covers a lot of ground, from Austria and Corsica to France and Switzerland, and Greece and Yugoslavia. The verse is usually held to refer to Napoleon (1769–1821), but other candidates include the Holy Roman Emperor Ferdinand II (1578–1637) and even Adolph Hitler (1889–1945). (See LeVert 1979, 80; Randi 1982, 34.)

(Another quatrain [VIII:1] that is also said to refer to Napoleon begins with the three words *Pau, Nay, Oloron*, which are interpreted [Robb 1961, 43–44] as an imperfect anagram ["Nay-pau-lon-Roy"] of *Napoleon Roi* ["King"]. However, Napoleon was not a king, and the words are simply the names of three proximate French towns [Randi 1982, 207–212].)

3. The Rise of Adolph Hitler. Another quatrain, II:24, is said to refer to Adolph Hitler most specifically. Nostradamus (1555) wrote:

Bestes farouches de faim fluues tranner:
Plus part du camp encontre Hister sera,
En caige de fer le grand fera treisner,
Quand Rin enfant Germain obseruera.

I translate the quatrain provisionally as:

They'll swim the rivers, fiercely famished brutes:
Most of the army shall range the Ister;
In an iron cage will be drawn The Great
When Rhine's child shall Germany watch over.

Hister is said to denote "Hitler," and in the late 1930s Nazi propaganda minister Josef Goebbels, whose wife was "an avid Nostradamian," exploited this and other quatrains that supposedly prophesied France's fall after a German invasion (Hogue 2003, 313).

Hister, or rather Ister, is actually an old name for the lower Danube River. The last line of the quatrain is rather confusing, and translators have given many different renderings. Some later texts replaced *Rin* with *Rine* ("the Rhine") or *rien* ("nothing"). And *Germain* can mean "Germany" or another word of the exact same spelling, i.e., "brother" or "cousin." And so the verse could read, "When a child [of the] Rhine shall keep watch over his brother" (LeVert 1979, 111), or "When the German child watches the Rhine" (Robb 1961, 47), or "When the German child will observe nothing" (Leoni 1982, 169), or other possibilities. However, because *Hister*, *Rin*, and *Germain* are all capitalized (Nostradamus 1555), thus consistent with proper

names, and also because Nostradamus [III:58] uses *Rin* for "Rhine" elsewhere, I translate the words as "Ister," "Rhine," and "Germany." LeVert (1979, 111) observes that, to Nostradamus's contemporaries, the "Child of the Rhine" would indicate Charles V (1500–1558).

4. The Great London Fire. This obscure verse—quatrain II:51—has received increasing attention, some believing that it forecast the Great Fire of London in 1666. Nostradamus (1555) wrote:

Le sang du iuste à Londres fera faute
Bruslés par fouldres de vint trois les six.
La dame antique cherra de place haute:
De mesme secte plusieurs seront occis.

I translate the quatrain thusly:

Blood of the just in London shall be scarce,
With twenty three seized, by thunderbolts burned.
The senile lady shall fall from high place:
Of the same sect many more will be slain.

Nostradamus's verse does specifically mention London and people burned. The falling of the "old lady" (*La dame antique*) is said to be "the subsequent falling of the statue of the Virgin from St. Paul's steeple" (Roberts 1949, 6), though there appears to have been no such statue (Randi 1993, 191). The phrase that translates as "twenty three the six" (or "sixes")—three times twenty plus six—could suggest the year '66.

However, line two is missing a syllable and may be corrupt. Printers of the era sometimes set type as someone read the text aloud (Gaskell 1972, 49, 112–13), so what sounded like *Bruslés par fouldres de vint trois les six* might actually have read, *Bruslés par fouldres plus de vint trois saisis* ("Burned by lightnings, more than twenty-three seized"). In any case, Nostradamian skeptics propose a reasonable explanation of this verse—that it is a contemporaneous reference to Queen Mary Tudor of England ("Bloody Mary" [1516–1558]) and her persecution of Protestants, many of whom were burned at the stake. Her atrocities resulted in her downfall. The word *antique* in the third line usually means "ancient" but can also mean "eccentric" or "senile." Mary was considered deranged and at her death was incoherent and apparently insane (LeVert 1979, 123–24; Randi 1993, 191–92).

None of the Nostradamians seems willing to accept the more obvious explanation that Nostradamus was a failed seer.

Woodcut of the Great Fire of London

5. A Mysterious Forecast. Among Nostradamus's cryptic verses is quatrain III:58, which while historically murky is in another sense quite illuminating. The seer wrote (Nostradamus 1555):

Aupres du Rin des montaignes Noriques
Naistra vn grand de gents trop tard venu,
Qui defendra SAVROME & Pannoniques,
Qu'on ne saura qu'il sera deuenu.

I translate the quatrain this way:

Close by the Rhine from the Noric mountains,
A great one's born of people come too late.
He'll defend Saurome and Pannonians;
It shall not be learned what has been his fate.

Nostradamus predicts the birth of a "great one" whose people are late arrivers to a region "near the Rhine from the Noric mountains" (the Noric Alps). This leader will defend "Saurome" (as it should be spelled, a Slavic area, now Lithuania) and the "Pannonians" (apparently Hungarians), though his end will be unknown (LeVert 1979; Roberts 1949, 96; Leoni 1982, 611; Hogue 1997, 265–66). Nostradamians are puzzled by the quatrain, although Leoni (1982, 611) suggests an interpretation such that "the prophecy was fulfilled in reverse" and notes that some others have applied the quatrain to Hitler. Less torturously, Roberts (1949, 96) holds that "it obviously refers to an event and character in his time now lost in the maze of history."

None of the Nostradamians seems willing to accept the more obvious explanation that Nostradamus was a failed seer. When he says of the "great one" that "it will not be learned what will become of him," the prognosticator tacitly admits that he, too, is unable to see what the future holds!

6. Failed Prophecy of Persia. Here is one of Nostradamus's predictions, in quatrain III:77, that gives a specific date of occurrence (Nostradamus 1555):

Le tiers climat soubz Aries comprins
Lan mil sept cens vingt & sept en Octobre,
Le roy de Perse par ceux d'Egypte prins:
Conflict, mort, pte: à la croix grād opprobe.

I translate quatrain III:77 as follows:

The third climate, under Aries' listing,
October, seventeen twenty-seven,
Those of Egypt capture the Persian King.
Conflict, death, loss: the Cross disgraced even.

The second line of Nostradamus's astrological forecast is usually understood to give the date as "1727 in October" (Leoni 1982, 213; Robb 1961, 59). However, LeVert (1979, 181), calling attention to the caesura (the mid-line pause common to quatrains), observes that it could be read "one thousand seven hundred [pause] twenty and seven in October," i.e., October 27, 1700, but this seems overreaching.[2]

Whatever date in the eighteenth century is chosen, the prophecy is clearly a failed one. Some Nostradamians attempt to interpret the verse's "those of Egypt" as Turks who conquered Egypt in 1517, but as Leoni (1982, 614–15) observes, the Turks "did not, by any stretch of the imagination, capture (or even defeat) the Persian ruler." Neither was any particular shame brought to Christendom. "And if 'Egypt' is taken literally, there has been no war between Egypt and Persia since 1555 (or in fact since the 6th century BC), though there may well be one in the future." Leoni concludes that Nostradamus's prophecy is therefore "a well-dated failure" (Leoni 1982, 615).[3]

(Neither is this quatrain the only one with a dated prediction that has failed. Quatrain X:72 forecast, for the seventh month of the year 1999, the coming "from the sky" of a "great King of Terror" from a place called *Angoulmois* [Nostradamus 1555]. Whether the word is interpreted as the French district *Angoumois* or as an anagram for *Mongolois* [Mongols—see Leoni 1982, 434–35, 750], the specified events did not occur.)

7. The Invention and Flight of the Montgolfier Balloon. In quatrain V:57, Nostradamus (1557) wrote:

Istra du mont Gaulfier & Auentine,
Qui par le trou aduertira l'armée:
Entre deux rocz sera prins le butin,
De Sext. mansol faillir la renommee.

I offer the following translation:

Going from Mount Gaussier and Aventine,
Through the hole one notifies the army;
Two rocks the booty is taken between,
For Sext. Mausol. to lose celebrity.

Some Nostradamians (e.g., Ionescu 1987) have interpreted the quatrain as predicting the invention of the Montgolfier balloon, the hot-air craft used for the first successful human flight in 1783. Stuart Robb (1961, 143) views it as "one of the most amazing prophecies of the French seer." Supposedly, the quatrain specifically cites Montgaulfier [*sic*]; the word *trou* or "hole" refers to the balloon's opening; and so on. Unfortunately, *Gaulfier* is an obvious printer's error, a common misreading of the Middle-French long *s* (it resembles *f*), coupled with an early version of the name of a hill near Saint-Remy (*Gaulsier*), actually spelled *Gaussier*.

There, at the foot of Mount Gaussier, is a celebrated once-supposed "mausoleum" (actually only a monument) of Sextus. (Hence, Nostradamus's "Sext. mansol" is obviously a reference with another printer's error: an inverted *u* having become an *n*.) Nearby are the *deux rocz* ("two rocks") and *le trou* ("hole") through the mountain that Nostradamus surely refers to (see Leoni 1982, 266, 649; Randi 1993, 184). Therefore, the quatrain does not represent a prophecy of balloon flight but is instead a murky reference to some obscure incident—real or imagined—from the boyhood of Nostradamus, who was born at Saint-Remy (see also Roberts 1949, 164). Basically, the quatrain states how, once in the region, passage through "the hole" was effected to alert an army and a certain *butin* (plunder) taken between two rocks, causing the Sext[us] Mausol[eum] to lose its renown.

8–9. The Terrorist Strike on New York City. Some say the following quatrains—VI:97 and X:49 (text from 1557 and 1568 editions, respectively)—predict the attack of September 11, 2001:

Cinq & quarante degrés ciel bruslera,
Feu approucher de la grand cité neusue,[4]
Instant grand flamme esparse saultera,
Quāt on voudra des normās faire preuue.

Iardin du monde aupres de cité neufue,
Dans le chemin de montaignes cauees
Sera saisi & plonge dans la Cuue,
Beuuant par force eaux soulfre enuenimees.

Here are my translations of the two quatrains:

At forty-five degrees shall burn the sky,
Fire to approach the new grand city thence;
Instantly great scattered flames will arise,
When one shall seek the Normans' evidence.

Garden of the world near the new city,
In the pathway of cavernous mountains,
Seized and plunged into a cauldron shall be,
Forced to drink water that's sulfur-poisoned.

Following the September 11 terrorist strike on New York City, a fake prophecy attributed to Nostradamus told of an attack on the "City of York." The real Nostradamian prophecies refer only to "the new city" and "the new grand city." One verse's "hollow mountains" are interpreted as skyscrapers, and there is no doubt—with references to flames and waters poisoned by sulfur—that Nostradamus is forecasting calamity (Hogue 2003, xii–xiv).

However, *before* the terrorist attacks Nostradamians were offering non-terrorist explanations. Roberts (1949, 96) interpreted the first quatrain as saying, "A cataclysmic fire shall engulf the greatest and newest of the world's big cities." Of the second, he said (1949, 328): "This startling prophecy of a catastrophic event at a pleasure resort not far from the great new city, predicts a tremendous tidal wave of poisoned waters that shall sweep in from the resort and overwhelm the man-made mountain-like skyscrapers of the city." Neither of these scenarios is compatible with a terrorist attack on New York, whether by nuclear means or not (Hogue 2003, xiii). Indeed, Nostradamus would seem to be speaking of Europe, at least in the first verse with its reference to "the Normans." (In any case, New York City is not at forty-five degrees latitude but instead well under forty-one.)

10. The '2012' Predictions. Several of Nostradamus's quatrains supposedly anticipate the year 2012, the last year on the Mayan calendar (Hogue 1997). Twenty-twelvers believe that something portentous will occur then—if not the end of the world, perhaps some New Awakening of Consciousness and blah, blah, blah. Quatrain II:62 has been mentioned in this regard (Nostradamus 1555; see Andrews and Andrews 2008, 265):

> *Mabus puis tost alors mourra, viendra*
> *De gens & bestes vne horrible defaite:*
> *Puis tout à coup la vengence on verra*
> *Cent, main, soif, faim, quād courra la comete.*

Here is how I translate quatrain II:62:

> Mabus then afterwards will die;
> comes next
> A horrible defeat of men and beasts:
> All at once vengeance will be seen to
> vex.
> A comet's pass—bloody hand,
> hunger, thirst.

The word *mabus* is unidentified, but some Nostradamians believe it refers to Saddam Hussein, noting (incorrectly) that *mabus* spells *sadam* when held before a mirror. (In fact it reads *sudam*—with the *s* and *a* backward [see Andrews and Andrews 2008].) A more likely possibility is that the handwritten word was misread by the typesetter's reader, that it was actually *malus*, meaning "the evil one." Also, the first word of the last line, *cent* ("one hundred"), is more likely the similar-sounding *sang* ("blood") (see LeVert 1979, 129).

Nostradamus predicted many calamities—often heralded by a comet, according to a superstition of his time. However, he did not make a doomsday prophecy, merely stating in a later preface that his forecasts "extend from now to the year 3797" (qtd. in Leoni 1982, 127). Nevertheless, Twenty-twelvers seem to be "desperately trying to find a way of decoding a 2012 prediction from Nostradamus' quatrains" (Stray 2009, 268).

* * * *

As these examples show, one cannot claim that Nostradamus successfully predicted the future. In his book *The Occult Conceit*, Owen Rachleff (1971, 138) characterized Nostradamus's prophecies as "exquisite examples of ambiguity, aided by a keen sense of history." However, James Randi (1993, 223) did see the future regarding Nostradamus, predicting many years ago that his legend would survive:

> An ever-abundant number of interpreters will pop up to renew the shabby exterior of his image, and that gloss will serve to entice more unwary fans into acceptance of the false predictions that have enthralled millions in the centuries since his death. Shameless rationalizations will be made, ugly facts will be ignored and common sense will continue to be submerged in enthusiasm.

Amazing! Every word has come true! □

Notes

1. Since 1568, the original text's *Deux classes vne* has been rewritten as *Deux plaies une* ("Two wounds, one") so that it would better fit King Henry's death in 1559. Actually, Nostradamus's *classes* means "fleets" everywhere else in the quatrains (Leoni 1982, 576).

2. Roberts (1949, 102) attempts to convert the date to 2025 using a "special chronology" he divines from Nostradamus.

3. See Robb (1961, 59–61) for a contrary view.

4. Here is another *s*/*f* mistake: *cité neusue* should be *cité neufue* as in the other of the pair of quatrains (X:49)—in modern French, *cité neufve*.

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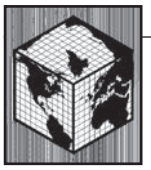

An Unlikely Séance

Once the most common kind of "spiritual" gathering, and for some an alternative form of entertainment, the séance is extremely rare today. Mediums are no longer what they used to be. They now contact "entities" in daylight, without going into a trance, in front of hundreds of people and on television. Or so they claim.

But at the turn of the ninetenth century, a séance could be a truly touching, emotional, and even scary experience. You were invited to someone's house, where a medium tried to contact your deceased loved ones. People sat around a table or held hands while the medium was enclosed in the spirit cabinet. Lights were lowered or extinguished, and then the wait began. In the dark, people could pray, sing spiritual anthems, or simply breathe in unison and follow the medium's instructions.

It might take ten minutes, half an hour, or even more time before anything happened. And the anticipation grew. Then, suddenly, you thought you were on another planet. You started hearing whispers, strange voices coming from afar. You heard steps around you, felt breezes, and smelled scents. Maybe a feeble light flickered or moved around the room. It soon took the shape of a human form or a face. A ghost! The strange entity moved around the room, speaking to and touching participants. The table rocked, the medium levitated in the air, or flowers fell from the ceiling. Finally, everything turned quiet. The lights were turned up, and everything looked normal once again.

It was all very spooky, especially if you did not know about the medium's unseen assistants, dressed in black and creating the phenomena occurring around the room.

When we were approached by an Italian spirit medium who said he wanted CICAP (the Italian skeptics group) to test his "powers," we agreed right away. He called himself "Magus Matheus Faust," but his real name was Signor Teodosio Lavinia, from the town of Potenza in southern Italy. He claimed he could evoke spirits to move and shake any three-legged table. "Table tipping" had been a standard of séances, but he had something new to offer: he claimed he did not need to touch the table for it to move. It sounded interesting.

It was all very spooky, especially if you did not know about the medium's unseen assistants, dressed in black and creating the phenomena occurring around the room.

'This Room Is No Good!'

RAI, an Italian TV network, somehow heard about this challenge and asked permission to film the test live. We planned to conduct the experiment in the laboratories of the Department of Chemistry at the University of Pavia, where we had often conducted testing of psychic claimants.

On the agreed-upon morning, the medium arrived quite early. He wanted to check the conditions of the test. We had searched for different kinds of three-

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legged tables, at his specific request, and came up with five of different heights and weights. He examined each one of them carefully, lifting and touching them one by one. Finally, he chose one that he said could work for the test. But something was wrong.

"There is a problem here," he said in a thick Southern Italian accent.

"What problem?" we asked.

"The floor is no good!" he said.

He meant that it was not sufficiently smooth. The small cracks between the tiles might prevent the table from sliding. We suggested placing the table on top of a large wooden platform. After we did so, he waved his hands on the table (Merlin style) a few times, examined the platform, and then shook his head.

"No good!" he repeated. "No good at all!"

The wood, he explained, stopped the "spiritic fluid" that apparently came from underground and needed direct contact with the legs of the table. The table could not move under such conditions.

When examining people claiming psychic powers, it is important that test conditions are as favorable for the claimant as possible—provided, of course, that they do not allow for misinterpretations or trickery. This way, any possible failure cannot be attributed to unfavorable conditions or the skepticism of the experimenters.

Patiently, we searched for another place to perform the test. The only apparently suitable room we could find without cracks between tiles was a cramped space under a staircase. Psychic, table, and crew moved to the new location, but alas, nothing could be done there either.

"Here's too gloomy," the medium said. "I can't breathe in here!"

Back again to the original room, where the psychic said he could try to perform the test.

"Ok, much better now!" he said, quite relieved. "It will work here."

He then felt confident of his success in the same place where he had earlier claimed it could not be done at all. The fact that the TV crew was growing impatient may have had something to do with his decision.

The Table Tilts

As we usually do before such tests, we asked the medium to give us an informal demonstration. We wanted to be sure that his powers could work well in that particular room and that the lights, cameras, and people present would not affect his ability. In case of a failure under test conditions, those elements could not then be blamed as the possible source of the failure.

He looked at us suspiciously at first but then agreed: "OK, I can do this!"

He asked us to sit around the table and place the tips of our fingers on the surface of the table. He did the same. Suddenly, without even attempting to hide it, he started to push down on his side of the table, forcing it to tilt.

"What are you doing?" we asked. "You are pressing on the table!"

"Ah! But you know nothing!" he replied. "I am not pressing. It is the fluid coming from my fingers that presses down."

"But you said you did not need to touch the table in order to move it," we reminded him.

"That is very difficult! I can only try that once, during the official test, not now." We did not argue any longer but instead put the table back in place and decided to start the actual test.

Cameras rolling, we took our places around the table and put our fingers on it as before. After a few seconds, the medium started to moan and call for the spirits in his heavy accent. Oddly, he didn't do any of this during the trial test. He then placed his fingers on the surface of the table and pushed down. Again, the table tilted, but he added a new twist to the trick. When the table was inclined on two legs, he removed his hands and left it in this precarious position.

Then it was apparent how he usually succeeded in this demonstration: he was going to claim that any movement caused by us in the attempt to keep the table still was actually produced by the fluid emanating from his hands, which he kept dramatically waving in the air.

He then felt confident of his success in the same place where he had earlier claimed it could not be done at all. The fact that the TV crew was growing impatient may have had something to do with his decision.

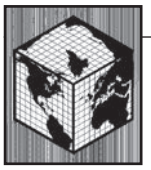
We decided we would not give him the chance to pull this on us in front of the camera. So we immediately put the table back on the floor and asked him to move it from that position; just a few millimeters would have been enough.

The medium appeared to be shocked by this change in the program. He said he could try and appeared to concentrate for a while. It took only a few minutes before he stopped and said that he had had enough.

"The spirits are a-gone! They don't like it in here," he said to explain his failure. Before the end of the filming, however, we explained to the TV viewers how the medium had really been able to incline the table by pressing on it.

When his turn came to explain his failure and reply to our accusations, he merely shrugged his shoulders. "It's their fault, not mine!" he said. "They lack the psychic energy!"

He was the medium, but if we want to see real psychic powers at work, we had better provide it ourselves. □



Startling Reflections in the Neandertal Genome

Considered neither chic nor sleek, Neandertals were once the Richard Nixons of extinct hominins. But thanks to a newly published draft sequence of our (kissing?) cousins' nuclear genome, we don't have Neandertals to kick around anymore. In fact, one could argue—as Svante Pääbo, paleogeneticist at the Max Planck Institute in Leipzig, Germany, and leader of this project recently has—that Neandertals aren't really extinct at all.

Modern humans and Neandertals share a common ancestor that lived between 270,000 and 400,000 years ago, according to Pääbo's new estimate. This ancestor lived in Europe and Asia—only as far east as southern Siberia and only as far south as the Middle East. Fossil evidence suggests that modern humans and Neandertals encountered one another in some way in the Middle East from at least 80,000 years ago, and then later in Europe. But, for reasons highly contested and yet unclear, *Homo sapiens* pressed on as Neandertals vanished from the record around 28,000 years ago.

Bell chested and burly, with protruding brow ridges and feeble chins, Neandertals suffer much abuse in the popular imagination. Traditionally they have been portrayed crudely as dullards because of their brutish appearance. Their reputation as one-trick ponies follows their inability to survive either irregular climate circumstances or (alternatively) the invasion of Cro-Magnon man during the late Pleistocene Epoch.

But science has recently rehabilitated the Neandertal narrative. For whatever it's worth, their brains were probably as large as (or larger than) ours. Apparently gifted with symbolic thought, they decorated their bodies with jewelry and probably pigment. They hunted expertly with stone points as well as implements crafted from wood and bone. In 2007, Johannes Krause (also a member of Pääbo's team) reported that Neandertals carried *FOXP2*, the gene that allows humans to speak. And whatever the causes of their eventual passing may have been, Neandertals ruled Eurasia's volatile environs for more than 200,000 years—longer than our species has existed.

Neandertals were once the Richard Nixons of extinct hominins. But thanks to a newly published draft sequence of our (kissing?) cousins' nuclear genome, we don't have Neandertals to kick around anymore.

But the biggest news has just arrived. Neandertals, it turns out, are human—or at least a significant portion of most humans. In the May 7 issue of *Science*, Pääbo's international team of scientists published a draft sequence of the Neandertal genome composed of four billion nucleotides from three individuals. To

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their great surprise, they discovered that between 1 and 4 percent of the modern, non-African human genome is derived from our maligned and misunderstood relatives. In other words, Neandertals and modern humans interbred.

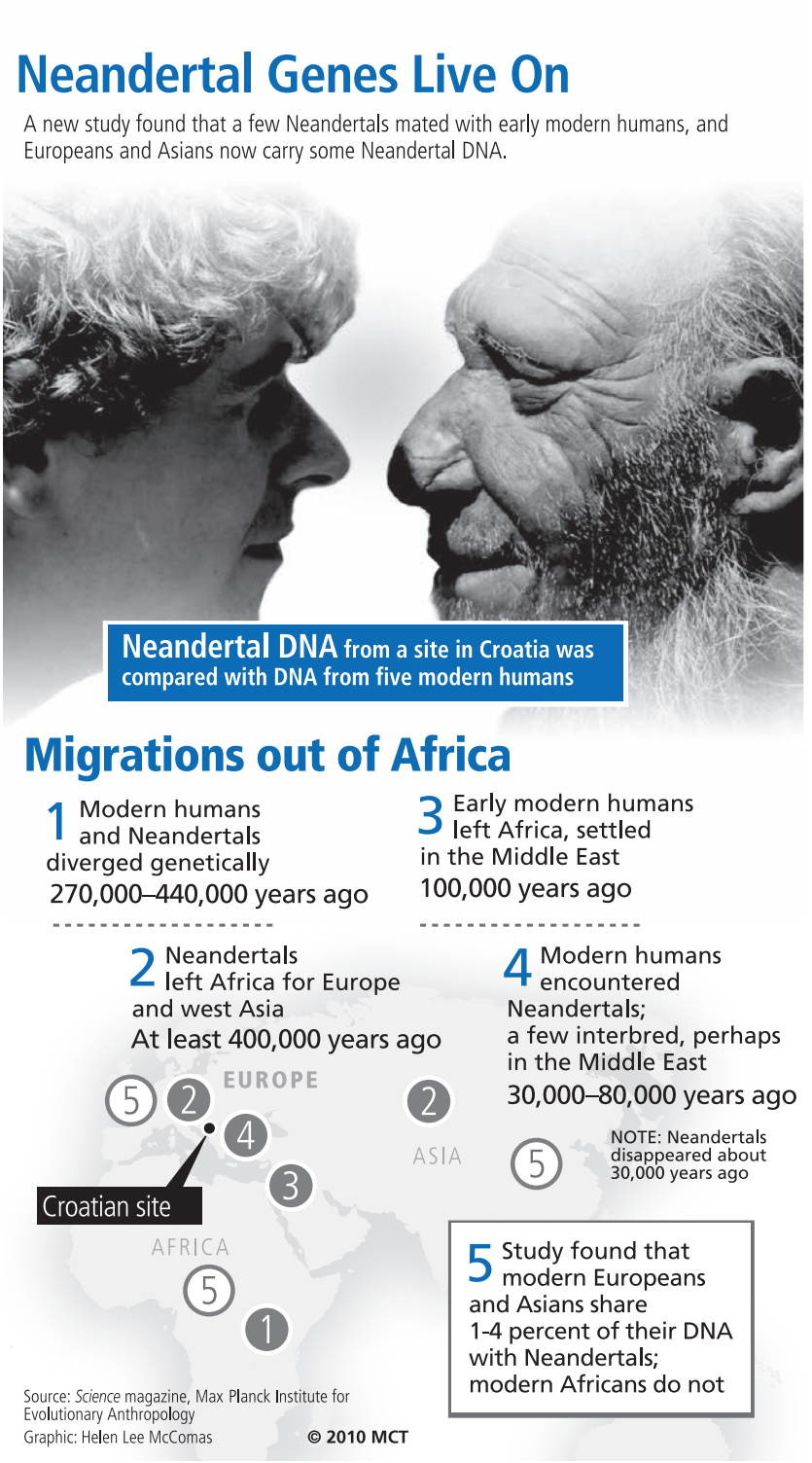
This outcome stunned Pääbo and his colleagues because previous analyses of Neandertal mitochondrial DNA showed that it consistently fell outside of the variation found in contemporary humans. On the other hand, many paleoanthropologists rather expected these results. Milford Wolpoff of the University of Michigan and João Zilhão of the University of Bristol in England argue that fossil evidence has long suggested interbreeding. For example, the 24,000-year-old Lagar Velho child, found in Portugal in the late 1990s, presents a mixture of Neandertal and *H. sapiens* traits.

Pääbo's team assembled the genome primarily using DNA from three Neandertal limb bones—each from a separate female individual—found in Vindija Cave, Croatia and dated at 38,000 to 44,000 years old. They confirmed the sequence with smaller samples from El Sidrón, Spain; Neander Valley, Germany; and Mezmaiskaya, Russia—none of which differed significantly from the Vindija specimens. By contrasting their results with the chimpanzee genome, Pääbo's team was able to distinguish ancestral genetic variants from their derived counterparts.

To find out whether Neandertals are more closely related to some contemporary humans than to others, Pääbo then compared the derived Neandertal variants to those contained in the genomes of five living humans—a San from Southern Africa, a Yoruba from West Africa, a French European, a Papua New Guinean, and a Han Chinese. The San and Yoruba were deemed appropriate proxies for genetic diversity in Africa because of their exceptionally ancient heritage. If gene flow between Neandertals and *H. sapiens* occurred prior to differentiation among human populations, Pääbo hypothesized, the Neandertal alleles would match those of individuals from some regions of the world more often than those of others.

And the results revealed exactly that. After ruling out the ever-present possibility of contamination, the team concluded that "Neandertals share significantly more derived alleles with non-Africans than with Africans." More specifically, Neandertals shared the same number of derived alleles with both the European and the Asians, but significantly more with either the European or the Asians than with either African. Notably, no Neandertal specimen has ever been found as far east as China or New Guinea.

Thus, Pääbo inferred, because Neandertals are more closely related to all present-day non-Africans, and equally so,


Neandertal Genes Live On
A new study found that a few Neandertals mated with early modern humans, and Europeans and Asians now carry some Neandertal DNA.
Neandertal DNA from a site in Croatia was compared with DNA from five modern humans
Migrations out of Africa
1 Modern humans and Neandertals diverged genetically 270,000–440,000 years ago
2 Neandertals left Africa for Europe and west Asia At least 400,000 years ago
3 Early modern humans left Africa, settled in the Middle East 100,000 years ago
4 Modern humans encountered Neandertals; a few interbred, perhaps in the Middle East 30,000–80,000 years ago
NOTE: Neandertals disappeared about 30,000 years ago
5 Study found that modern Europeans and Asians share 1-4 percent of their DNA with Neandertals; modern Africans do not
EUROPE
ASIA
AFRICA
Croatian site
Source: Science magazine, Max Planck Institute for Evolutionary Anthropology
Graphic: Helen Lee McComas
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Neandertals and non-Africans must have interbred with their common ancestors shortly after they departed from Africa into the Middle East but before their further migration into Eurasia. Such genetic exchange could have taken place about 80,000 years ago when Neandertal remains began to show up in Israeli caves already occupied by humans (Qafzeh, Skhul, and Tabun, for example), or even later, about 50,000 to 60,000 years ago, when a second group of *H. sapiens* set out from Africa. Even so, the team wouldn't completely exclude an alternative possibility—that their results might instead reveal an "old substructure" in Africa that lasted from Neandertal origins until non-African migration.

In any case, a prominent and long-standing debate in paleoanthropology has finally been resolved. The Neandertal genome does indeed live on in present-day humans. But "the most interesting development," Pääbo recently told me, may be "the identification of genes that were positively selected in humans after their divergence from Neandertals." In other words, the Neandertal sequence has begun to reveal some of the recently evolved traits that make us uniquely human.

But there were surprises lurking here too. Using the chimpanzee, orangutan, and rhesus macaque genomes in addition to those of modern humans and Neandertals, the team located only seventy-eight recent nucleotide substitutions capable of altering the protein-coding capacity of genes where moderns are fixed for a derived state and where Neandertals bear the ancestral, more chimp-like version. And just five genes had accumulated multiple substitutions—a shockingly small number, given the ample span of time. Indeed, changes to human accelerated regions (HARs)—conserved throughout most of vertebrate evolution but altered drastically during hominin evolution—tended to predate the human–Neandertal split.

Even so, Pääbo was able to identify general roles, if not specific functions, associated with some of our newly altered genes. Three alleles carrying multiple substitutions affect skin physiology, including pigmentation (*TRPM1*). Others might pertain to cognitive development, mutations of which are presently implicated in causing autism (*CADPS2*, *AUTS2*), schizophrenia (*NRG3*), and Down syndrome (*DYRK1A*). Still others could be important for gene transcription (*TTF1*), wound healing (*PCD16*), energy metabolism (*THADA*), and the beating of the sperm flagellum (*SPAG17*).

The team couldn't say, however, whether these specific substitutions were the result of random drift or positive selection. They also searched the modern human sequence for "selective sweeps"—lengthy swaths of DNA including mutations absent in the Neandertal and chimp genomes. Extensive affected regions, the prevailing theory goes, imply relatively intense selective pressures. Again through genomic comparisons, Pääbo successfully identified 212 such sweeps in the modern human genome, many surrounding genes commonly thought to involve brain function in some way.

The new Neandertal sequence is imperfect to say the least. Although Pääbo's team decoded roughly 5.3 billion nucleotides in total—the human genome contains about 3 billion—much of that total consists of duplications. The team confesses as well that more than one-third of the genome remains unsequenced. Pääbo expects his fair share of criticism at some point, but he says it's a bit too early to expect serious reproaches from other scientists. The religious community remains silent as well, which Pääbo finds somewhat surprising.

Meanwhile, science turns its collective gaze forward. Pääbo wants to improve the screening process for positive selection and to follow up on specific candidate genes, the function of which may have been altered during recent human evolution. He hopes as well to explore the Neandertal sequence more fully to identify features unique to the species (or subspecies) and to illuminate Neandertal genetic variation by analyzing the remains of additional specimens. Additionally, perhaps his team will scrutinize the genomes of other extinct hominin forms to determine whether they, too, have contributed to the human blueprint.

Regardless, Pääbo and his colleagues have already advanced humanity's self-knowledge by meteoric leaps and bounds. We now have confirmation that the genomes of long-extinct hominins can be reliably salvaged. We know that the strictest "out of Africa" hypothesis of human origins is untenable, and that the environment—whether natural or man-made—continues to shape the contours of our epic evolutionary adventure. We should appreciate as well that genetic rifts between modern human populations can run quite deep indeed, and thus they can be ignored only at our common peril.

And hopefully we've gained a great deal more respect for our exceptionally intimate relatives, the Neandertals. Far from ugly, dim-witted, or incompetent, our "sister group," as Pääbo's team has dubbed them, will have much to teach us in the coming years. But many of us can't really talk about Neandertals as "them" anymore because, in fact, Neandertals are "us." □

In any case, a prominent and long-standing debate in paleoanthropology has finally been resolved. The Neandertal genome does indeed live on in present-day humans.

The Internet Is Really Bad—Or Is It?

Human civilization, it seems, is finally coming to an end. Surprisingly, the culprit is neither the proliferation of nuclear weapons nor climate change, but the Internet. At least that's the impression one gets these days from reading a number of articles on how the 'net is rewiring our brains or reading books like Nicholas Carr's *The Shallows: What the Internet Is Doing to Our Brains*. In his book, Carr compares his brain to that of HAL9000, the conscious computer of *2001: A Space Odyssey*. Just like HAL felt his brain being deactivated by his human antagonist in the movie, Carr feels that his own little grey cells are being reprogrammed so that he can only skim the surface of readings and is no longer able to immerse himself in the depths of a serious task. Apparently that didn't stop him from writing a book, an enterprise that I can assure you is made much easier by the existence of the Internet and requires a significant ability to focus for sustained periods of time.

Carr is only the latest in a long tradition of intellectuals who complain about the introduction of new technologies and ways of learning and communicating. As Jonah Lehrer reminds us in his *New York Times* review of Carr's book (May 27, 2010), Socrates thought that books were a really bad idea, taking away from our ability to memorize and transmit oral traditions. And in the seventeenth century, Robert Burton complained of the chaos and confusion created by the availability of so many books. That was a full four centuries before Amazon.com.

Socrates thought that books were a really bad idea, taking away from our ability to memorize and transmit oral traditions. And in the seventeenth century, Robert Burton complained of the chaos and confusion created by the availability of so many books.

Of course, it is not difficult to come up with real life examples of people whose lives have, in fact, been significantly disrupted by the new technology. *The New York Times* published a long article (June 6, 2010) on the Campbell family of San Francisco. Mr. Campbell "craves the stimulation he gets from his electronic gadgets. He forgets things like dinner plans, and he has trouble focusing on his family. . . . He goes to sleep with a laptop or iPhone on his chest, and when he wakes, he goes online. . . . When he rides the subway to San Francisco, he knows he will be offline [for] 221 seconds as the train goes through a tunnel." Mrs. Campbell "makes breakfast and watches a TV news feed in the corner of the computer screen while [Mr. Campbell] uses the rest of the monitor to check his e-mail." Okay, that really does call for medical intervention, but contrary to the *New York Times* commentary, this isn't "your brain on computers"; it's *the Campbells'* brains on computers.

What makes current complaints about the Internet something more than the latest Luddite rant is that they appear to be based on science, not just anecdotal evidence. Carr, for instance,

Massimo Pigliucci is professor of philosophy at the City University of New York–Lehman College, a fellow of the American Association for the Advancement of Science, and author of *Nonsense on Stilts: How to Tell Science from Bunk*. His essays can be found at www.rationallyspeaking.org.

refers to a study of scientific citation patterns revealing an increasing trend to cite chiefly the recent literature. The allegation is that the Internet is making all of us read the same stuff, but a more sensible interpretation would be that scientists tend to cite more recent works because they focus on the latest advances, not on the history of the field. In fact, the availability of online databases of journal articles and books that go back many decades makes it possible for us to look at a much larger chunk of the literature in a much shorter period of time than ever before.

Perhaps the most compelling research so far on the dangers of multitasking with new technologies is the one that *The New York Times* uses as the basis for a test (which, apparently without irony, you can take online at http://nyti.ms/axA8qk) that measures your ability to focus and juggle tasks. I took the test because I was somewhat skeptical of the claims. The idea is to compare how well you do with two experimental groups: so-called low and high multitaskers. The latter are the Internet-damaged poor devils who can't focus and only fool themselves into thinking they are multitasking. Even though I'm a high multitasker and a heavy user of the Internet (and of my Droid and Kindle), I actually scored better than the average low multitaskers (the control group) and easily crushed the high multitaskers. This is, of course, anecdotal evidence based on a sample size of one, but what are the chances that I am beyond the nintey-ninth percentile in this regard?

The reality is that we don't know much about what the Internet is doing to our brains. It is certainly affecting them because *anything* we do affects our brains, particularly when it comes to intellectual activities. But the available research is a mixed bag, showing both potential problems, at least for some people, and some definite gains (e.g., in cognitive tasks ranging from visual perception to—surprisingly—sustained attention). We should pay close attention to what science has to say about all aspects of our lives, but I was struck by the sudden spate of doomsday scenarios that cite science to support them while curiously neglecting the considerable amount of science that reaches different conclusions.

In the end, of course, new technology will turn out to be a mixed blessing, just like Socrates feared. And, as usual, the problem is not the technology itself but how we use it. My new apartment in New York is entirely physical-book free, a situation that will probably horrify many readers. Yet I have tripled the number of books I read since I moved to the Kindle—not an insignificant positive result, especially when coupled with the much better use of my small city abode and lower carbon footprint of my paper-free surroundings. □

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Night Vision Optics Reveal Fleets of UFOs

As an amateur astronomer participating in science-education outreach, I often encounter beliefs and questions about UFOs, extraterrestrials, and other unusual subjects. However, until recently, never before had I encountered such a well-organized, dedicated, but ultimately clueless group of UFO watchers as those who turned up at one monthly public star party conducted by the San Diego Astronomy Association just outside the Fleet Science Center in San Diego's Balboa Park. Five young adult men, joined later by several women, were showing off their new night vision binoculars and cameras while asking all manner of questions about telescopes. It turns out that they were participating in one of UFOlogy's latest fads: using pricey high-technology night vision equipment to reveal things that the naked eye doesn't see—and calling what they don't understand "UFOs."

They were inspired by claims they had heard from a number of sources, including *Coast to Coast AM*, the well-known late-night paranormal and conspiracy-fest radio show hosted by George Noory (see http://tinyurl.com/3465no3, http://tinyurl.com/mqbfpq, and http://tinyurl.com/283pj29, which seem to show a bright satellite passing). The night vision equipment reveals objects that are too faint to be seen by the unaided eye. If you see something you can't identify, then it must be a UFO. Sometimes the men pointed a powerful green laser at such objects so others can try to see them. I warned them that if you are pointing a laser at an aerial object and you don't know what it is, you might be shining it into the cockpit of an aircraft. The point was appreciated.

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When it was my turn to look through the night vision binoculars (which I believe sell for approximately $2,500), I was astonished at how much I could see. Standing under the light-polluted urban skies, with many nearby streetlights and a marine layer developing (that's "fog" to you non-Californians), one could hardly see stars fainter than about magnitude two (the stars in the Big Dipper). But using the night vision device, which interestingly did not magnify objects but simply amplified light, I could easily see all of the stars in the sickle of Leo and the faint stars of Ursa Major as if I were out under dark skies in the country. Suddenly, a very bright white object dashed through my field of view, covering the distance from zenith to about 20 degrees elevation in a few seconds. A flying saucer? But it banked and turned back in my direction, and I could detect the flapping of wings. An owl had been spotted several times circling the lighted buildings nearby. When that owl flew directly over us, it was too dark to be seen with the naked eye, but the goggles easily picked it up.

I was told that the group had captured

Robert Sheaffer's "Psychic Vibrations" column has appeared in the SKEPTICAL INQUIRER for the past thirty years. He is also author of *UFO Sightings: The Evidence* (Prometheus 1998). His Web site is at www.debunker.com.

objects moving along like satellites that suddenly stopped and reversed themselves, which no satellite could do. However, none of the video clips they showed me on their camera confirmed this claim. They did show a clip of two satellites traveling side-by-side in tandem. I explained that they had very likely captured one of the clusters of the Naval Ocean Surveillance System satellites (see www.satobs.org/noss.html). The U.S. Navy operates several clusters of two or three satellites that maintain a strict formation and are apparently used to pinpoint the source of radio and radar transmissions. Normally they are too faint to be easily seen by the unaided eye, although occasionally the sun angle brightens them to naked-eye visibility. When UFO seekers stumble across one of these clusters using optical magnification or amplification, they often conclude that they have discovered a formation of UFOs.

Tim Printy has some interesting articles on night vision UFOlogy in his Web 'zine *Sunlite* (see http://home.comcast.net/~tprinty/UFO/SUNlite2_2.pdf). He notes that Ed Grimsley claims to have recorded "space battles" of UFOs in which there are as many as forty-five "kills" in one battle, which he is selling on DVDs. "Whoever it is we are battling, it is very serious and a threat to our National Security," Grimsley warns on his Web site. In fact, Grimsley claims to have been watching UFOs battling it out in the sky since he was a boy in 1961. Printy counters that it is "astonishing in that no astronomical telescopes or astronomers (professional or amateur) have seen these events even though Grimsley was able to see them with his unaided eye before he obtained his night vision goggles."

Printy continues, "Amateur and professional astronomers have been monitoring the skies with equipment far superior to what Grimsley is using for many years. For instance, you can read [online articles that describe the astronomers' photographic sky survey programs]. . . . These articles have been written in the past decade but the footnotes demonstrate that people have been doing this kind of work for some time. Does Mr. Grimsley seriously believe that all of these astronomers are not seeing this or, is it possible that these astronomers see what he sees and can readily identify them?"

The night vision UFOlogists I encountered wanted to buy a telescope, and they were apparently willing to spend $1,000 or more on it to get close-up videos of these objects. They were thinking about getting a Cassegranian reflecting telescope as large as eight inches in diameter, which can easily deliver a useful magnification of at least 400x. (Cheap telescopes sold in department stores often lure the unsophisticated with promises of magnifications of 600x or more. However, although any telescope can theoretically achieve any magnification if you throw enough doubling lenses onto it, the image quality is so poor it is useless.) The group would then demonstrate the existence of secret, off-the-record surveillance satellites or even actual extraterrestrial vehicles. After all, didn't some amateur photographers capture the International Space Station (ISS) clearly enough to reveal its shape? Yes, that's true, I explained. But there exists software to track Earth satellites using a telescope with a go-to mount, and the objects that you want to image are on unknown paths, so they must be tracked manually. The greater the magnification, the smaller the field of view and, hence, the more difficulty there is in tracking. I suggested they look into a small, wide-angle telescope of three or four inches diameter or, better yet, large binoculars in which one side is for the observer who tracks and the other is for the camera.

However, even if there were something spooky up there to track, this approach is unlikely to yield high-resolution images. Night vision optics trade sensitivity for resolution, and bright objects spill out into a circle of light that in no way reflects their angular size. A good pair of binoculars will reveal fainter objects than night vision counterparts, albeit with a smaller field of view but with much better resolution. There's nothing in the sky that a night vision device can see that I can't also see in my 10x50 binoculars, and I can see details much more clearly. But now that the fad for imaging UFOs in night vision has started and sophisticated equipment is being used eagerly by the unsophisticated, we can look forward to many more UFO claims from perfectly sincere persons who do not have a clear idea of what can be seen in the sky.

* * *

Spiral UFOs strike again! On December 9, 2009, news organizations worldwide reported sightings of a "mysterious giant spiral of light" over Norway (see my "Psychic Vibrations" column, SI, March/April 2010). Despite breathless speculation along the lines of "the space spectacle is an entirely new astral phenome-

non," the object turned out to be a Russian Bulava missile spinning while venting propellant, much like a spinning garden sprinkler.

On the morning of June 5, 2010, at approximately 5:50 AM local time, many observers in eastern Australia reported seeing a "strange spiral light" moving across the sky, and several captured it on video. James Butcher of Canberra told Australian Broadcasting, "It had a distinct bright centre, much like a bright star, indicating an object shedding light trails, spiralling and fattening out from it. The effect lasted only two or three minutes, moving and descending quickly out of view" (see http://tinyurl.com/Aussie Spiral). UFO enthusiasts on Web sites such as abovetopsecret.com quickly spun far-out explanations of what it might be, such as activity from "Australia's area 51."

But the Bad Astronomer, Phil Plait, got right on it. In a posting on his Bad Astronomy blog titled "Oh, Those Falcon UFOs," Plait explained that as soon as he saw the Australian videos, he was reminded of the Norway spiral from last December and surmised that it was probably a rocket booster venting excess propellant (see http://blogs.discovermagazine.com/badastronomy/2010/06/05/oh-those-falcon-ufos/). He obtained the ground track of a satellite launched from Cape Canaveral on the same day (the SpaceX Falcon 9), which placed the object right over eastern Australia at the time of the sightings.

However, Doug Moffett of UFO Research NSW wasn't buying any of that "rocket booster" business: "Firstly, the time of the launch was 18.45 GMT, which translates to 4.45am [Australian] EST, the duration of the flight was 9 minutes 38 seconds—this is a full hour before the reported sightings."

Plait countered, "This isn't a starship, it's a rocket, and takes time to go around the Earth. An orbit is usually 90 minutes in period, so it takes about 45 minutes or so to get from Florida to Australia. Plus, since this was a launch it wasn't moving at top speed the whole time; it took a few minutes to accelerate to orbital speeds. That makes the timing about perfect."

Moffet's next objection was, "Where was the glow from the boosters or from the friction created by the craft moving through the atmosphere, where was the tail of the rocket?"

Plait responded, "The Falcon 9 was up and outside the atmosphere in the first few minutes of flight, when it was barely over the Atlantic! So by the time it was passing over Australia it would've been a couple of hundred kilometers up."

Then Moffett, who seems not to understand the concept of "orbit," asked, "Why would anyone launch a rocket on a maiden test flight with a trajectory that would take it over the most heavily populated parts of Australia?"

Plait responded, "If the rocket failed, it would have done so over the Atlantic. That's why we launch rockets from Florida in the first place!" If the rocket made it as far as Australia, it did so because it was safely in Earth orbit.

And finally, Moffett speculated, "How big must this rocket have been to be seen so clearly, at the same time, over such a vast distance?"

Plait replied, "Anyone familiar with the sky knows that satellites are easy to spot with just your [naked] eye. Rockets can be even easier, especially when they're spewing out gas! This is something I've been saying for years: if you know what you're looking at in the sky—meteors, satellites, planets, and so on—a lot of UFO stories evaporate. The fact that so many reported UFOs turn out to be mundane objects is a pretty good sign that more than a few UFO enthusiasts aren't terribly familiar with observing the sky." □

Announcing the New Online SKEPTICAL INQUIRER Newsletter

The Committee for Skeptical Inquiry and the SKEPTICAL INQUIRER magazine have created one more way for readers to keep up with news and events. The inaugural edition of the electronically delivered *Skeptical Inquirer News* (yes, SIN) launched December 17, 2009. With this free monthly e-news publication, CSI will keep readers updated on new material, activities, and events of interest to the skeptical community.

Features include photos, guest-authored articles from key figures in today's skeptical movement, introductions and successes of skeptics' groups, reports from events and conventions, news of investigations, updates on developing stories, matters of concern to the skeptical community, legislation and policies to keep an eye on, links to media stories featuring CSI members, and more.

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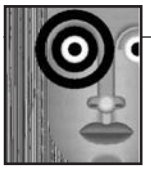
To receive the free *Skeptical Inquirer News*, enter your address in the "E-Mail Updates" box in the left-hand column of the CSI homepage (www.csicop.org).



The Truth about the 9/11 Truthers

Q: What's up with the "9/11 Truth" movement? From what I gather, 9/11 Truthers believe that the September 11 terrorist attacks were an inside job by the U.S. government—and some scientists support their claims. Is this true?

—F. Nocedal

A: Perhaps no event in the past few decades has spawned more conspiracy theories than the September 11, 2001, terrorist attacks. The confusion and chaos of the event bred myths and misinformation that remain long after the toxic dust settled over Manhattan. Some stories were outright hoaxes, such as the infamous photo of a doomed tourist taken atop one of the World Trade Center towers just before a plane hit. Some were well-intentioned myths about the terrorists and their victims. In the absence of clear and immediate answers, wild speculation ran rampant, and conspiracy theorists inevitably latched onto the biggest conspiracy since the Kennedy assassination or the Roswell crash.

The evidence that the terrorist attacks were indeed the result of a conspiracy is overwhelming. There's no doubt about it: a close (or even cursory) look at the evidence makes it clear that the attacks were carefully planned and executed by conspirators. The question, of course, is who those conspirators were. Osama bin Laden and the crew of (mostly Saudi Arabian) hijackers were part of the conspiracy, but what about President Bush and Vice President Dick Cheney? Did top Bush advisors, including Paul Wolfowitz and Donald Rumsfeld, collaborate with bin Laden or intentionally allow the attacks to happen? Put another way, was it an inside job?

Groups such as the 9/11 Truthers believe it was and point to a catalog of supposed inconsistencies in the "official version" of the attacks, often based on real or perceived "anomalies." Many of the technical conspiracy claims were debunked by *Popular Mechanics* magazine in March 2005, while other claims are refuted by simple logic: If a hijacked airplane did *not* crash into the Pentagon, as is often claimed, then where is Flight 77 and its passengers? Are they on ice with the Roswell aliens at Hangar 18?

The claims of 9/11 Truthers are far too varied and detailed to go into here, but CSI Fellow Dave Thomas recently described his experience debating a 9/11 Truther in our December 2009 *Skeptical Briefs* newsletter. Thomas notes:

> None of the 9/11 Truth claims really hold up under scrutiny. For example, regarding the Twin Towers' collapse, [California architect Richard] Gage often uses a demonstration using three cardboard boxes to make his point. . . . In fact, it is an excellent example of pseudoscience. What's actually relevant here is load vs. structure: the fact that *dynamic* loads are not the same as *static* loads. . . . Once the top floors of the towers fell even one floor's height, the horrifying "piledriver" collapse became inevitable. I showed how WTC 7 had been severely damaged by debris from Tower 1 and showed evidence (routinely ignored by "Truthers") of the severe fires that burned for many hours in Tower 7.

Thomas cautions, "Don't smugly assume this conspiracy is confined to the lunatic fringe. After years of polishing and refinement, 9/11 Truth efforts have persuaded many citizens, including some of my relatives and close friends, to consider the attacks an 'inside job.'" In many conspiracy theories, bureaucratic incompetence is mistaken for conspiracy. Our government is so efficient, knowledgeable, and capable—so the reasoning goes—that it could not possibly have botched the job so badly in detecting the plot ahead of time or responding to the attacks. I'm skeptical. □

Note: The SKEPTICAL INQUIRER will have more on the September 11 conspiracy claims in a future issue.

MARTIN GARDNER
1914–2010

A Tribute and Celebration

Martin Gardner, the polymath writer, critic, and skeptic who is widely regarded as the father of modern skepticism, died May 22, 2010, in Norman, Oklahoma, at the age of ninety-five. He helped found our Committee for Skeptical Inquiry (then CSICOP) and wrote for this magazine since its inception. (His final "Notes of a Fringe Watcher" column appears on page 10.) Throughout his life, Gardner wrote knowledgeably about an astonishing range of topics with a combination of clarity, wit, and critical intelligence that delighted readers worldwide. Those who knew him regarded him as a dear friend, a modest man, and a national intellectual treasure. In a celebration of his life, writings, and mind, we here present invited tributes from a number of noted skeptics and scholars. We begin with two of his closest friends and colleagues, Ray Hyman and James Randi. Like him, they were founding fellows of CSICOP and original and longtime members of its executive council.

–The Editor

Martin Gardner: A Polymath to the Nth Power

RAY HYMAN

Persi Diaconis phoned me on May 17, 2010. He told me he recently spoke with Martin Gardner by phone. Among other things, they had talked about me. He also said that Martin sounded fine and seemed to be as cognitively sharp as always. I had not spoken with Martin for quite a while. I made a note on my calendar to call him on Saturday, May 22. On that Saturday, I was about to call Martin when I got a phone call from Martin's son, James. James told me that his father had passed away a few moments earlier.

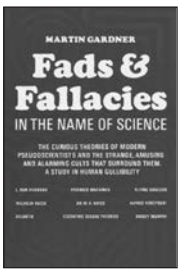
Many persons—too many—would seek mystical meaning in this "coincidence." Martin, of course, devoted much of his life to teaching us how easily our minds create meaning out of post hoc juxtapositions of random events. Although he thought that most believers were impervious to reason, he persevered in his quest to show that most, if not all, paranormal claims cannot be supported by the evidence. He felt that his background as a magician enabled him to explain how many alleged psychic occurrences were due to trickery or mundane causes.

I first met Martin in 1950 at the home of Bruce Elliot in Greenwich Village in New York. Bruce published a magazine on magic, *The Phoenix*, and wrote several books about magic. Every Saturday he hosted a gathering for magicians from New York or who happened to be in the vicinity. I was twenty-one years old when I was invited to attend. This was the first time I met many celebrity magicians such as Dai Vernon, Jay Marshall, and Martin Gardner.

Martin and I became good friends. I knew him as a magician, a creator of magic effects, and a writer of excellent books on magic. In addition, we shared an interest in investigating and challenging paranormal claims. Soon after our first meeting, Martin published his classic *In the Name of Science* (1952). The book was re-issued in 1957, with some updating, under the title *Fads and Fallacies in the Name of Science*. It serves as the prototype for modern skeptical criticism.

From 1958 to 1961, while I was doing psychological research for General Electric, I lived in Hartsdale, about twenty-five miles from Martin Gardner's home on Euclid Avenue in Hastings-on-the-Hudson, New York. During this period my wife and I would get together with Martin and his wife, Charlotte, for dinner. I also was able to visit and talk with him about our mutual interests.

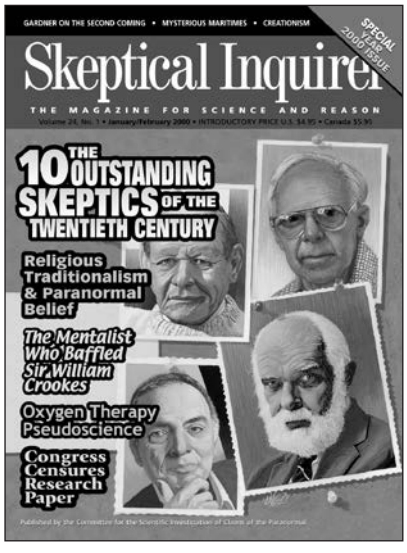
When I moved to Oregon in 1961 to work at the University of Oregon, Martin phoned Jerry Andrus and told him I had moved into his neighborhood. He suggested that Jerry contact me. Jerry did and we became close friends until Jerry's unfortunate death in August 2007. Martin and Jerry are the two most impressive individuals I have ever known. Both were essentially self-taught in magic, philosophy, science, and other areas.



You can gain some insights into the range and impact of Martin's productive life by reading the many obituaries that have appeared online. In the remaining few lines at my disposal, I will discuss only a couple of my many personal stories involving this Renaissance man.

I have always been interested in how productive individuals organize their lives and manage their data. Soon after Martin's operation for cataracts, I asked him how he managed to read and review so many books while continuing his prodigious literary output and maintaining a colossal correspondence. Martin told me that, in most cases, he did not actually read the books he reviewed. Instead, he simply scanned the index, which provided all the information he needed for his review.

I was incredulous at first, but on second thought I realized that this was consistent with my research on information theory and redundancy. I had already discovered that I could scan the indices of textbooks in statistics, perception, and cognitive psychology and know all I needed to know about how the book handled its topic. For example, by noting the topics the author listed and, more importantly, the ones she did not, I could confidently guess her stance on various issues. This was because I already knew these areas quite well. Martin's ability to exploit redundancy induced me to conduct research on speed reading. I discovered that graduates from speed reading classes who claim to be reading 1,000 or more words per minute are actually skipping over large chunks of text by exploiting redundancy. When they are given text to read from domains with which they are unfamiliar, their reading drops to the same speed as those who have never taken a special course.


GARDNER ON THE SECOND COMING • MYSTERIOUS MARITIMES • CREATIONISM
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Congress Censures Research Paper

Martin not only wrote the seminal textbook for the modern skeptical movement, but he was also central to the actual founding of the movement. In December 1972, I was sent by the Defense Department to observe Uri Geller and the researchers at the Stanford Research Institute (SRI). My report, which I shared with Martin, made it clear that nothing that this alleged psychic did had anything to do with the paranormal. Soon after that, Randi observed Geller at the offices of *Time* magazine in New York. He, too, saw through Geller's pretensions.

In 1973, Randi phoned me from Portland, Oregon. He was touring with Alice Cooper and asked me to travel from Eugene to Portland to meet him. While I was in Portland, Randi reviewed our experiences with Geller and suggested that we get together with Martin Gardner and form a group to counter false claims of the paranormal. He suggested we call the group SIR (Sanity in Research), which evoked the acronym SRI.

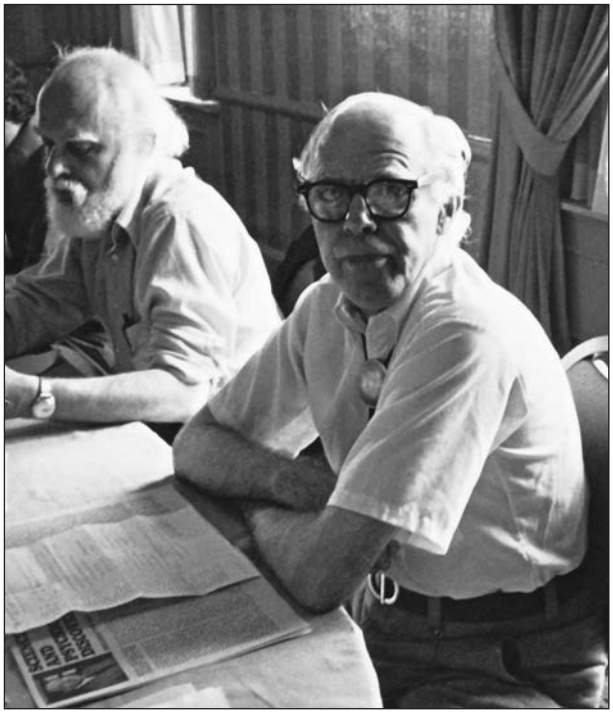
Randi and I soon afterwards spent a day with Martin at his home in Hastings-on-Hudson preparing a detailed document of the goals and hopes for our new group. In 1976, SIR joined forces with Paul Kurtz, who was already publishing skeptical articles in *The Humanist*, which he edited at that time. The resulting organization became known as CSICOP (now CSI), and the contemporary skeptical movement was born.

Ray Hyman is emeritus professor of psychology at the University of Oregon. An expert in the psychology of self-deception, he is a founding fellow of CSICOP and founding member of the CSICOP executive council.

Martin Gardner Has Left Us

JAMES RANDI

Where to begin? I've really no idea where or exactly when I first met Martin Gardner. I believe our first meeting occurred in the offices of *Scientific American* magazine more than six decades ago, but it seems that I have always known him. He became such a fixture in my life, such a dependable part of my world. I was so very accustomed to picking up the telephone to call him or answering a call from him that always resulted in an improvement of my knowledge of the universe.



Martin Gardner (front) and James Randi at the very first CSICOP meeting, August 1977 in New York City.

Traveling the world, as I have done most of my life, I've found that some academics doubt that I actually knew this legendary figure in person. I recall that when I delivered a lecture to the systems engineers of IBM many years ago, a talk during which I referred to Martin, I was besieged by a group from the audience who asked me to settle whether Martin was an actual individual or perhaps an amalgamation of Isaac Asimov, Arthur C. Clarke, and maybe a magician colleague of mine, since his writings so frequently touched on the sort of expertise that only such a trio could summon up. They were appropriately amazed and edified when I assured them that this paragon was actually a single person, a real human being who was quite as accomplished as he appeared to be.

Another matter on which I was queried from time to time was whether or not Martin actually had academic degrees in mathematics—which he did not. As he once expressed it to me, after beginning his column in *Scientific American* (SA), he sort of learned it as he went along. And I must say that I believe that was true. He always expressed his delight at something that he had just stumbled upon or that had occurred to his agile mind as he applied it to a problem at hand. Indeed, "delight" was a major characteristic of this man's makeup. That enthusiasm certainly carried over into his books and his SA column. He was constantly celebrating discoveries, expanding on them, and looking for new ways to communicate them to the public—and especially to young people. He was never happier than when he was in the company of kids to whom he would present a brain teaser, followed by the "Aha!" phase in which he would provide an answer—usually totally unexpected—that made everything quite clear.

That lucidity of his work made him a great teacher. His weaving of a story might have been inspired by his total admiration for the Alice stories by Lewis Carroll. He pored over every sentence that Carroll had constructed and extracted from them every sort of nuance he could, and of course he recorded his observations in writing—to the delight of his many, many fans over the years and around the globe. Martin's spectrum of interest was very broad. His coterie of friends included major professional magicians, mathematicians of every sort, philosophers, a few scoundrels, and a sufficient variety of weirdos to round out his perception of the world. As an atheist myself, I admit that I was somewhat surprised that this man was a deist. When I inquired about this apparent lapse of logic, he calmly informed me that he was well aware the atheists had a much better argument than he did and that in fact he had no supporting evidence for his acceptance of a deity. It simply made him "feel more comfortable," and knowing Martin as I did, I merely accepted that fact and somewhat celebrated it. Anything that improved Martin's life improved mine.

At our next Amaz!ng Meeting in July, we of the James Randi Educational Foundation will certainly not hold any sort of memorial to Martin Gardner. That would have embarrassed him hugely, I'm quite sure. His son Jim, calling me to announce his father's demise, added that the will he left behind specified that there be no funeral and that cremation would be preferred. That's my Martin, and I expected no less. No, at the July conference we will celebrate the existence of this fine gentleman, one of my giants, a huge intellect, a prolific author, and a caring, responsible, citizen of the world. If we can manage it, we'll have balloons and dancing girls—which would have titillated Mr. Gardner, I guarantee you.

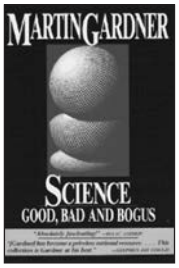
Yes, he's gone away, but his wise words and his great love for reason and compassion will remain with us forever. I loved him dearly, but I leave him to the ages.

Magician, investigator, and writer James Randi is founder of the James Randi Educational Foundation. Randi was an original member of the CSICOP executive council and is a founding fellow.

Martin Gardner's Contributions to the World of Books

PAUL KURTZ

Martin Gardner was a unique man of letters, a science writer who not only wrote columns for *Scientific American* and the SKEPTICAL INQUIRER but who was a prolific author of over seventy books! Perhaps his reputation in the long run will depend on the provocative books that he authored over the years. Although we may be at "the beginning of the end of the Age of Books" (alas!), Gardner stands out as a heroic author whose books on pseudoscience we hope will be read in the future with relish and delight—as reminders of how easy it is to be deceived.



I know Martin Gardner best as a book author; Prometheus Books published at least twenty-five of his books. Several of these were new editions of books previously published. I founded Prometheus in 1969, and it has devoted more attention than any other press to publishing books on scientific skepticism and the paranormal. Martin was tickled pink that Prometheus Books was willing to take on the paranormalists.

I first got to know Martin when I founded the modern skeptics movement (in the guise of CSICOP, later CSI), so to speak, and invited him to the inaugural meeting at the State University of New York at Buffalo on April 30, 1976. I was delighted when he accepted and even more so when he appeared. His publishing romance with Prometheus began a few years later. He shared with us a devotion to books—the idea that books should be cherished as virtually "sacred" because of their enduring contributions to culture.

Martin's first book with Prometheus was *Science: Good, Bad and Bogus* (1981). *The New York Times* described it as "a valuable book . . . an ally of common sense." It was a nominee for a national book award. So his career with Prometheus got off to a rousing start. We would hear from him almost biweekly thereafter, as he kept proposing books and then saw them through the editorial process until publication. Martin had a keen intelligence and a sharp wit, which he used with consummate skill.

Martin Gardner (right) talking with Paul Kurtz at 1989's CSICOP Executive Council meeting in Tampa, Florida. Gardner rarely attended meetings, and his legendary elusiveness seems evident even here, with his back mostly to the camera.

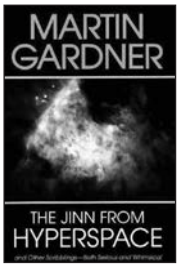
We were intrigued with the titles that he came up with, such as *On the Wild Side* (hardcover 1992, paperback 2004), which dealt with the big bang, ESP, the Beast 666, levitation, rainmaking, trance-channeling, séances, ghosts, and more. Another one was *How Not to Test a Psychic* (1989). (Incidentally, the complete list of Martin Gardner's books still available from Prometheus Books may be read online.)

It was amazing to me how Martin was able to delve into what many considered nutty claims. He took them seriously and made them seem even nuttier, such as in his book *Urantia: The Great Cult Mystery* (1995, revised 2008). Martin told me that he maintained extensive clippings on a wide range of topics and so could bring empirical facts to bear to expose the beliefs held.

An important book by Martin was *Great Essays in Science* (1994), which included thirty-one of some of the best writings in science over the past 100 years. These included thought-provoking contributions that represented the peak of accomplishments in science.

Prometheus also published a novel by Martin called *The Flight of Peter Fromm* (1994), which seemed to echo his own religious beliefs. I was curious that Martin himself clung to his religious faith in God, somewhat apologetically. "I can't prove it," he seemed to say, "but I am attached to it." I found this statement rather charming, if only because it contradicts doctrinaire atheists who insist that any true skeptic must be an atheist.

Gardner's last new book with Prometheus was *The Jinn from Hyperspace and Other Scribblings—Both Serious and Whimsical* (2007). *New Scientist* reviewed the book by stating that it was "clear, closely argued, and entertaining . . . a fascinating insight into the breadth of interest and fecundity of the man now in his nineties."



To which I say amen about all of Gardner's books, an inexhaustible treasury of insight and wisdom. Martin Gardner played a key role in his time as a keen advocate of science, a luminary in the constellation of skeptics. He will be sorely missed.

Paul Kurtz is the founder of the Committee for Skeptical Inquiry, the Council for Secular Humanism, the Center for Inquiry, and Prometheus Books. He is emeritus professor of philosophy, State University of New York at Buffalo.

We Have Lost an Icon

JAMES ALCOCK

It takes a special kind of person to write insightfully about quantum mechanics and mathematics—*and* literature *and* religion *and* pseudoscience *and* conjuring *and* philosophy. And it takes a very special kind of person to be able to do so in a way that is comprehensible, enlightening, entertaining to the intelligent layperson, and worthy of the respect of experts. Such a rare person was Martin Gardner, and his achievements are all the more impressive given that he was largely self-taught and without advanced degrees in physics, mathematics, literature, or philosophy.

I knew Martin Gardner the icon rather well, and I owe him a considerable debt for what I have learned from him over the years. When I was an undergraduate physics student, my classmates and I avidly devoured his "Mathematical Games" column in *Scientific American*, along with his published collections of mathematical puzzles and enigmas and his other books on science and mathematics. He helped make mathematics and physics delightful to pursue. Later on, when I switched disciplines and became a graduate student in psychology, I turned to his writings once again when I was asked—nay, virtually ordered—by the department chair to prepare a critical examination of extrasensory perception (ESP) for presentation to undergraduate students who were clamoring for such a talk. I knew nothing of the subject at the time; so where was I to begin, given the apparent paucity of critical literature on the subject? I dug out *Fads and Fallacies in the Name of Science* and let Martin introduce me to the subject. That simple beginning unexpectedly led me into decades of critical commentary and debate with regard to parapsychology.

Later on, as a young psychology professor, I was researching how people maintain their beliefs in the face of contradictory evidence. I wanted a demonstration that would confront subjects with ostensible evidence that something they held to be absolutely true was apparently false. Where to begin? I turned to Martin Gardner once again: I began re-reading some of his books and articles and soon came across the perfect vehicle for my research—a puzzle, invented a century earlier by Sam Lloyd but preserved and analyzed by Gardner, in which a piece of paper of a certain area, when cut into pieces and the pieces rearranged, appears quite clearly to have gained in area. This was ideal for my purpose, for psychologists had long believed that all of us acquire in childhood a firm belief in "conservation of area," so that we "know" that area cannot be changed by the rearrangement of component parts.

I had always been very impressed by Martin Gardner the icon, but I was fortunate enough to be able to meet Martin Gardner the man. This came about when I was made a member of the CSICOP executive council. With this appointment, I was delighted that I would rub shoulders with the man himself, for he was one of the founders of CSICOP and a member of its executive council. I soon learned, however, that he was averse to travel and did not usually attend council meetings. I therefore had to wait to meet him until a meeting was held in Atlanta, which was near enough to his home at the time that he did indeed attend. Martin the man proved to be as impressive as Martin the icon. He was gentle, intelligent, witty, modest, curious, and filled with creative energy and imagination. A longtime fan such as I could not avoid feeling a little star-struck, although it was very clear that stardom was the last thing that he wanted. I remember our first conversation very well: he was a major contributor to the conjuring literature, and when he learned that I was an amateur magician, he immediately and graciously responded by sharing with me a new magical effect that he had just invented. I was struck by his warmth, his lack of pretense, and his excitement about sharing new ideas.

As I reminisce, I see that Martin has had an important influence on me—as he no doubt has had upon countless others who have been devoted to his scholarship—for a very long time. Whether as Martin the icon or Martin the man, he has enriched our lives. We shall all miss him.

James Alcock is professor of psychology at Glendon College, York University, Toronto, and author of such books as *Parapsychology: Science or Magic?* He is a founding CSICOP fellow and became a member of the executive council in 1983.

A World Treasure

KENDRICK FRAZIER

One day back in 1974, when I was editor of *Science News* in Washington, DC, the mail brought a letter from Martin Gardner. I knew of him, of course, as the "Mathematical Games" columnist in *Scientific American* and as author of the seminal work about pseudoscience and crackpots, *Fads and Fallacies in the Name of Science.* I'd had a copy of that fascinating book since a friend gave it to me as a gift in graduate school. I loved it. Martin's letter gently but firmly criticized us for a series of three articles we had run over a period of months dealing with some fringe science matters: Uri Geller, Kirlian photography, and Transcendental Meditation. Readers had requested the articles. This was the heyday of Geller's then-rising popularity, and Geller had some (naive) scientists vouching for his powers. The other two subjects were likewise attracting a lot of media and popular interest. We had done our best to treat them carefully and with some skepticism, but except for the one on Geller, Martin didn't think we'd done a particularly good job and was worried we'd put aside our usual scientific standards by writing about them at all.

I wasn't at all offended by his criticism; in fact, I welcomed it. I wrote him back. I told him science writers and editors like me had few resources for checking the validity of these kinds of claims. I told him we needed people like him who

had the necessary critical perspective and information to help us. Some sort of group of scientific experts was needed to give us that kind of help.

So it was perhaps not surprising that in the spring of 1976 I found myself covering for *Science News* an unusual conference on "The New Irrationalisms: Pseudoscience and Anti-Science" at the brand new SUNY Buffalo campus, at which philosopher Paul Kurtz announced the creation of the Committee for the Scientific Investigation of Claims of the Paranormal. It was exactly what I had asked for. My subsequent article for *Science News*—our cover pictured a small knight-like skeptic with only a sword of reason challenging a giant multi-headed dragon of pseudoscience (May 29, 1976)—stimulated more reader response than any other subject we had ever written about, which told me that this was a rich topic meriting much further examination. The nicest and most unexpected letter I received—I just now rediscovered it in my archives of those early events—was from Martin Gardner. He thanked me for the article, praised its accuracy, and called it a "wind of fresh air, long overdue."

One year later I was an invited guest and speaker at the first meeting of the CSICOP Executive Council, held at the old Biltmore Hotel in New York City with Paul Kurtz, Ray Hyman, Phil Klass, and others including Martin Gardner himself, to my delight. The next day I was asked to join the organization as editor of its new magazine (then called *The Zetetic*, renamed the SKEPTICAL INQUIRER the next year). So Martin Gardner was not only my introduction to any kind of systematic skepticism and one of my early encouragers, but he was also there when I actually joined the effort.

Over the ensuing three-plus decades, it was my—and our readers'—pleasure to have Martin Gardner write regularly for SI. At first he wrote only occasional short articles and reviews. When he retired his *Scientific American* column after thirty years, I wrote and asked if he'd like to consider writing a regular column for SI on pseudoscience and fringe science. I was delighted when he agreed. Let's give it a try, he answered, and see how it goes. That column ("Notes of a Psi-Watcher," which he and I later renamed "Notes of a Fringe Watcher") appeared in every issue of SI from Summer 1983 to January/February 2002. He recently resumed it on an irregular basis, and his last one, mailed to me May 12, ten days before his death, appears on page 10.

Martin was an editor's delight. His columns always arrived early, usually weeks ahead of deadline. Sometimes he would check with me in advance about a possible subject; more typically he just mailed in a new column, surprising me with the topic. A new one's arrival was always the high point of my day. They were clear, concise, involving, revealing, knowledgeable, relevant, and usually witty—the product of a lively, extraordinarily well-informed, unique mind. His columns were substantive but at the same time eminently readable. He typed them double-spaced on an electric typewriter, and the newspaperman in him (which he had once been for awhile after studying philosophy at the University of Chicago) carefully corrected any typos or made short word changes with black ballpoint pen. Also in the newspaper tradition, he revised sections by cutting and pasting, which was always done impeccably. I seldom had to do any real editing.

Martin Gardner (with glasses) is at back left in this historic photo of the first CSICOP meeting, in August 1977 in New York City. From left are Lee Nisbet, Ray Hyman, James Randi, Gardner, and (at end of table) Paul Kurtz. (CSICOP archives)

Over the years his columns covered everyone from Russell Targ, Margaret Mead, Shirley MacLaine, Arthur Koestler, Rupert Sheldrake, Marianne Williamson, Jean Houston, Doug Henning, and Phillip Johnson to maverick Cornell astronomer Tommy Gold (twice); and everything from James Randi's Project Alpha (his first SI topic) to weird water, fuzzy logic, reflexology, urine therapy, psychic astronomy, the Klingon language, and the humorous yet profound question of whether Adam and Eve had navels. Every few years he would collect the SI columns, together with a few reviews and essays published elsewhere, in a new book. The first were *The New Age: Notes of a Fringe Watcher* and *On the Wild Side.* The latest three are *Are Universes Thicker Than Blackberries?* (2003), *The Jinn from Hyperspace* (2008), and *When You Were a Tadpole and I Was a Fish* (2009).

On September 11, 2001 (yes, that same terrible day), I opened a letter from Martin that I had dreaded recieving. His beloved wife, Charlotte, had died earlier of a stroke, and he was getting two columns to me quickly because he knew he would soon go into a depression over her loss and be unable to write any more. And, besides, he was eighty-seven. "I've had a long run," he ended, "and doing the column has been a great pleasure." It was a sad day for all of us. But in 2005 I saw a new book review he had published elsewhere, and I wrote and invited him to once again write for SI if he felt he could. His first was a two-article series on "The Memory Wars." We published it in our

January/February and March/April 2006 issues. The first part appears in our latest SI anthology, *Science Under Siege* (Prometheus, 2009).

He was prolific to the end. We had two columns from him during the production of our March/April 2010 issue. So we published the shorter one (about fatal sweat lodge guru James Arthur Ray) as his regular column and the longer one (about Oprah Winfrey and her gullibility on pseudo-medical matters) as an article.

Perhaps surprising for such a towering intellect, Martin was a modest and unassuming man. Kindly, I would say. Obviously highly intelligent and a supremely clear thinker, he showed no sign of ego. A somewhat shy person, he never attended conferences or spoke at public gatherings. Although this was a disappointment to his myriad fans, I think he felt his time was better spent doing his own kind of research, reading up on the latest claims of nonsense and crackpottery and buffoonery, and giving his unique critical perspective in clear, concise prose. But he was a wonderful correspondent. Any letter to Martin drew an almost immediate typewritten response. That was true of my experience, and I have heard the same from others. His letters were always friendly, direct, relevant, useful, and concise. He never wasted words. I have quite a collection of such short letters from Martin and will always treasure them.

Martin Gardner was—among many other things—a brilliant and essentially self-taught intellectual who had the respect of the world's greatest scientists and academics. The grandfather of the modern skeptical movement, he was an extraordinarily knowledgeable skeptic with a uniquely whimsical and easily amused mind who never took himself over-seriously, a great teacher through example of what skepticism and skeptical inquiry are all about, a clear writer and thinker, a peerless critic of nonsense, and a steadfast advocate of science and reason—in short, a national treasure. No; make that a world treasure.

Kendrick Frazier is editor of the SKEPTICAL INQUIRER, a fellow of the Committee for Skeptical Inquiry, and a longtime member of its executive council.

Martin Gardner's Presence

JOE NICKELL

Martin Gardner gone? Skeptics, say it isn't so!

From my earliest days as a magician, skeptic, and investigative writer, Martin was there—a presence as reassuring as that of a beloved relative whom one could always count on when needed but who showed up in person only at the occasional family reunion. Extraordinarily shy, Martin avoided public appearances and didn't lecture, grant media interviews, or even accept awards when they were conditional on his appearing.

Still, he was there. When I was transforming myself into "Mendell the Mentalist" as a young magician, Martin helpfully pecked out on his typewriter a suggestion: a mind-reading effect based on a principle usually embodied in a close-up trick that he very cleverly adapted to the stage.

Once, while I was working as a researcher on a certain project, Martin invited me to visit his home in Hendersonville, North Carolina, and use his extensive personal library. (This I declined, of course, for it would have been too great an imposition on too generous a friend.)

When I reviewed an event held in honor of the shy genius (who had made an exceedingly rare appearance) for the SKEPTICAL INQUIRER, Martin thoughtfully wrote a personal note of appreciation.

And he thought of this same writer in 2002 when he ended his long-running column for SI (since 1983), "Notes of a Fringe Watcher." Asked who he thought might succeed him as leading columnist for the magazine, he wrote, "Joe Nickell?"

I did not meet Martin in person until 1989 when he uncharacteristically appeared at a CSICOP Executive Council meeting in Tampa, Florida. He did not usually wear ties, but someone got him one for a formal group photo, and I was able to give it a straightening just in time. At the 1996 Gathering for Gardner in Atlanta, Georgia, I brought a tape recorder on behalf of Prometheus Books and recorded Martin in his hotel room reading the introduction to the audiotape version of *Science: Good, Bad and Bogus.* Time spent with him was precious.

But it was as a writer that his presence was most clearly felt. Despite his personal shyness, his writings were those of a polar opposite: a bold, courageous critic, a prolific correspondent, and a towering thinker and polymath. (Never mind that he once said in an interview in these pages [March/April 1998], "I just *play* all the time, and am fortunate enough to get paid for it.")

In 1952 he published the first edition of his seminal book, now known to skeptics worldwide as *Fads and Fallacies in the Name of Science.* The book proved to be the seed that blossomed into the modern skeptical movement. Gardner mentored a small group of skeptical activists—including magician James Randi, psychologist Ray Hyman, and several others—a group that in 1976 philosopher Paul Kurtz expanded and turned into an international organization known as the Committee for the Scientific Investigation of Claims of the Paranormal (presently the Committee for Skeptical Inquiry).

Now Martin Gardner belongs to history, to the pantheon of great intellects of the twentieth century—many of whom were his admirers. A one-man think tank and the father of modern skepticism, he was a presence indeed. But he remains a presence, still alive in our minds, often smiling amid the juggled words, still teaching us to think—and to not forget to have fun.

Joe Nickell is CSI's senior research fellow and SI's "Investigative Files" columnist. He is author of dozens of books about his skeptical investigations, such as *Real or Fake, Adventures in Paranormal Investigation, Relics of the Christ, Real-Life X-Files,* and *Looking for a Miracle.*

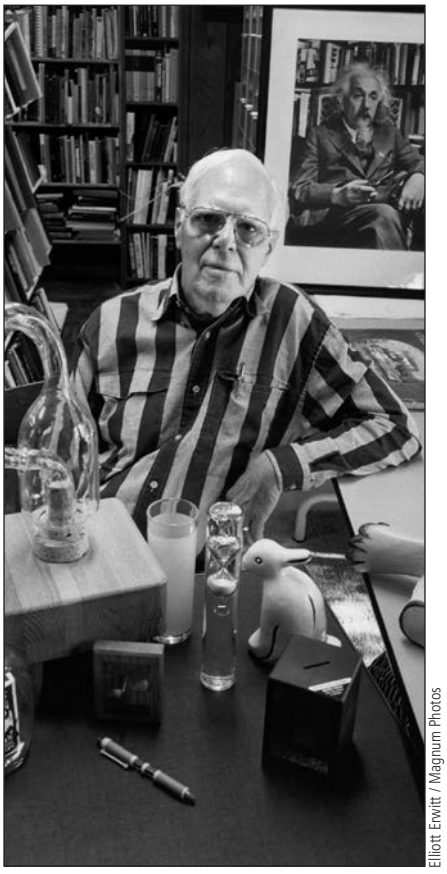
The Humble Demigod

ROBERT SHEAFFER

I was aware of Martin Gardner at least since I was in high school in Illinois during the 1960s. I hung around as much as I could with friends who were interested in science and philosophy, and in such circles Gardner was already considered a demigod, at the very least. I forget exactly when I first read his *Fads and Fallacies in the Name of Science*, but I was enormously impressed by it. He covered so many subjects in such detail, using such impeccable logic. (From a current standpoint, what's sobering is how many of these fads and fallacies, thoroughly debunked almost sixty years ago, are still peddled, usually in nearly the same form!)

I first met Gardner at one of the very early CSICOP functions in New York City in 1977 or '78. He was still living in New York at the time (appropriately on Euclid Avenue in Hastings-on-Hudson). CSICOP held several press conferences to offer itself as a resource for responsible science journalism, as well as to denounce the often-uncritical coverage of "paranormal" subjects in the media. This was long before CSICOP sponsored any public events. I had been working fairly closely with the noted UFO skeptic, the late Philip J. Klass, one of the founding fellows of CSICOP, who helped me get involved with the organization and its activities. Gardner attended all of the CSICOP events in New York City but never spoke to the public or to the press. I remember being awestruck to have the opportunity to meet, and get to know, this soft-spoken, extraordinary man.

I was even more awestruck when he suggested we go down to the hotel restaurant to have lunch together. I realized even at that time that this was an extraordinary privilege. I asked him about his training in mathematics, expecting to hear him rattle off a list of studies and degrees. "I didn't take much math," he replied. "I studied philosophy." I expected to hear that mathematical puzzles flowed effortlessly out of his brain, but that was also not so. He explained that he was not an expert in mathematical puzzles or even a big fan of them; he just kept writing them up because that was what the readers of *Scientific American* wanted, and typically he was just one puzzle ahead of the magazine's deadline. We also discussed the famous Cottingley Fairy photos, which had fooled Sir Arthur Conan



Elliott Erwitt / Magnum Photos

Doyle, and how at that time UFOlogist Jerome Clark, then an editor at *Fate* magazine, was claiming the photos as proof of some sort of "alternate reality." Gardner wrote about that in the notes and also in a postscript to his essay "The Irrelevance of Conan Doyle," published in *Science: Good, Bad and Bogus*. He also wrote there about my own hoax article suggesting that the Cottingley Fairies were Winged UFO Occupants: "It was printed in *Official UFO* magazine, October 1977, by editors too stupid to realize that Sheaffer had his tongue in his cheek."

Later Gardner asked me if I wanted him to mail me his UFO files, saying that I would make better use of them than he could. I gladly accepted his offer. The files were not extensive, consisting mostly of clippings from newspapers and magazines of the 1950s and '60s, but they contained a number of hard-to-find items. I gratefully merged them with my own files.

After Gardner moved to North Carolina, I never saw him in person again. But we remained in touch on a number of subjects. I remember one time when I contacted him for information about a specific cult. He said that the most knowledgeable critic of that group was a certain individual who I had never heard of. "But be careful in your dealings with him," Gardner said. "He is obsessed with this cult, and he has a history of unstable behavior." I cautiously followed up on his lead and discovered that, as usual, Martin had gotten it exactly right.

Looking back on his career, perhaps the most surprising thing is not only the quantity and the quality of his output but the fact that all of it was written without benefit of a computer or word processor! I cannot write anything worth publishing unless I revise it three or four times. He had an amazingly clear writing style: everything Martin Gardner wrote, no matter how technical, is explained so well that the average reader can understand it, and every conclusion he reaches follows directly from the information he just set forth.

Some of the late founding fellows of CSICOP, whose names today are household words, had egos the size of Texas, if not Alaska. This stands in enormous contrast with Martin Gardner, a man for whom they all genuinely proclaimed their admiration yet was nonetheless one of the most sincere and likable human beings I have ever met.

Robert Sheaffer is a fellow of CSI and has been SI's "Psychic Vibrations" columnist for more than thirty years.

A Martin Gardner Sampler

It is not at all amusing when people are misled by scientific claptrap.

Fads and Fallacies in the Name of Science (Dover), p. 6

There is a type of self-styled scientist who can legitimately be called a crank. It is not the novelty of his views or the neurotic motivation behind his work that provide the grounds for calling him this. The grounds are the technical criteria by which theories are evaluated. If a man persists in advancing views that are contradicted by all available evidence, and which offer no reasonable grounds for serious consideration, he will rightfully be dubbed a crank by colleagues.

Fads and Fallacies in the Name of Science, p. 8

The modern pseudoscientist . . . stands entirely outside the closely integrated channels through which new ideas are closely integrated and evaluated. He works in isolation.

Fads and Fallacies in the Name of Science, p. 11

Even when a pseudoscientific theory is completely worthless there is a certain educational value in refuting it.

Fads and Fallacies in the Name of Science, p. 321

I'm not sure why I enjoy debunking. Part of it surely is amusement over the follies of true believers, and [it is] partly because attacking bogus science is a painless way to learn good science. You have to know something about relativity theory, for example, to know where opponents of Einstein go wrong. . . . Another reason for debunking is that bad science contributes to the steady dumbing down of our nation. Crude beliefs get transmitted to political leaders and the result is considerable damage to society.

"A Mind at Play," interview in the SKEPTICAL INQUIRER, March/April 1998, p.36-37

Although "debunker" is often considered a pejorative term, I do not find it so. A major purpose of SKEPTICAL INQUIRER has always been to debunk the most outrageous claims of bogus science. I make no apologies for being a debunker. I believe it is the duty of both scientists and science writers to keep exposing the errors of bad science.

Did Adam and Eve Have Navels? (W.W. Norton), p. 2

For every example of a crank who later became a hero there were thousands of cranks who forever remained cranks.

Science: Good, Bad and Bogus (Prometheus), p. xiii

Cranks by definition believe their theories and charlatans do not, but this does not prevent a person from being both a crank and a charlatan.

Science: Good, Bad and Bogus, p. xiv

In discussing extremes of unorthodoxy in science I consider it a waste of time to give rational arguments. Those who are in agreement do not need to be educated about such trivial matters, and trying to enlighten those who disagree is like trying to write on water. . . . For these reasons, when writing about extreme eccentricities of science, I have adopted H.L. Mencken's sage advice: one horse-laugh is worth ten thousand syllogisms.

Science: Good, Bad and Bogus, pp. xv, xvi

Exposing Crackpots and Charlatans

ROBERT CARROLL

Martin Gardner's writings on the paranormal and pseudoscience profoundly influenced a generation of writers, including me, as can be seen by the many references to his works in *The Skeptic's Dictionary*. He introduced us to a bizarre world populated by the likes of L. Ron Hubbard, Rudolf Steiner, Edgar Cayce, Bridey Murphy, and a host of other characters on the fringe. He taught us that crackpots and charlatans are dangerous. They should not be ignored but instead thoroughly exposed for what they are by detailed critical analysis.

My introduction to Gardner was through his *Scientific American* column on brain teasers and logic puzzles. When he gave up writing that brilliant and much-missed column, Douglas Hofstadter picked up the mantle. My obsession with Gardner's writings on the paranormal and pseudoscience began after reading a Hofstadter column titled "World Views in Collision: The SKEPTICAL INQUIRER versus the *National Inquirer*." Hofstadter's panegyric to CSICOP and SI is one of the seminal essays in the history of scientific skepticism. Every skeptic should keep it at the ready for inspiration and revitalization. (The essay, reprinted in Hofstadter's *Metamagical Themas: Questing for the Essence of Mind and Pattern*, includes an account of Gardner's split with Marcello Truzzi over how best to deal with Immanuel Velikovsky and other pseudoscientists.)

Hofstadter's essay inspired many teachers to become followers of SI, which inevitably led us to become followers of Martin Gardner's many inquiries. In fact, many of us became somewhat fanatical about our inquiries into what Gardner called "wild beliefs." We can't stop investigating and writing about them. Thanks to Martin Gardner, James Randi, and others of like spirit, we won't be quiet until the last bit of bogus science is buried with the last charlatan claiming paranormal or supernatural powers.

Robert Carroll is emeritus professor of philosophy at Sacramento City College and creator of The Skeptic's Dictionary Web site. He is a CSI fellow.

Visits to Martin

BRYAN FARHA

It was serendipitous that Oklahoma City University (where I teach) brought in James Randi to speak several years ago. While here, Randi asked me to take him to visit his beloved friend, Martin, in nearby Norman, Oklahoma. Martin had been in an assisted living center there since 2002. Randi introduced us, and this began my personal connection to Martin.

Since that day, I periodically visited Martin in his room. Two visits stand out. On one occasion the visit was professionally motivated because an author asked me to interview Martin for his book. About midway through, Martin turned the tables and *he* became the interviewer. I was surprised at his sudden interest in *me*. What stood out most was his inquiring about my beliefs and view of religion—just before I was going to ask him similar questions on the same subject. He sensed my frustration in not knowing exactly how to "label" my beliefs. After giving him a lengthy explanation, he said, "I know how to label your beliefs." He continued, "You're a philosophical theist, like me." It was great to finally be able to concretize my position. Until that time, I really didn't know what to call it. When my interview of Martin concluded, I went home and immediately Googled the term. The first thing I found was a Wikipedia definition. The end of the entry now states, "Martin Gardner (1914–2010) was a contemporary defender of philosophical theism." It was obvious Martin knew what he was talking about.

The other visit that stood out was personally motivated; I took my nine-year-old nephew, Cole, to meet this extraordinary man. Martin amazed Cole with visual illusions, which were displayed throughout his room. Particularly eye-catching to Cole was the "Paper Dragon" illusion—designed for a special gathering honoring Martin. He had a very effective way of using entertainment as an educational tool. It certainly worked for Cole. Although Cole may not have had a full appreciation for the magnitude of

I cannot recall when or why I first became interested in pseudoscience. . . . Not being a scientist, but only a science journalist, I have always been intrigued by fringe science, perhaps for the same reason that I enjoy freak shows at carnivals and circuses. Pseudoscientists, especially the extreme cranks, are fascinating creatures for psychological study. Moreover, I have found that one of the best ways to learn something about any branch of science is to find out where its crackpots go wrong.

On the Wild Side (Prometheus), p. 7

As all magicians know, physicists are among the easiest people in the world to be fooled by magic tricks. They are so used to working with Mother Nature, who never cheats, that when confronted with the task of testing a psychic charlatan they have no comprehension of how to set up adequate controls. . . .

Am I saying that all psychic researchers should be trained in magic, or seek the aid of magicians, before they test miracle workers? That is exactly what I am saying. The most eminent scientist, untrained in magic, is putty in the hands of a clever charlatan.

"Lessons of a Landmark PK Hoax," Gardner's first Skeptical Inquirer column, Summer 1983, p. 18; reprinted as "Project Alpha" in *The New Age* (Prometheus), 1991 paperback edition

I like to think I am unduly harsh and dogmatic only when writing about a pseudoscience that is far out on the continuum that runs from good science to bad, and when I am expressing the views of all the experts in the relevant field. Where there are areas on the fringes of orthodoxy, supported by respected scientists, I try to be more agnostic.

"A Mind at Play," interview in the Skeptical Inquirer, March/April 1998, p. 37

Finding 666 in the names of famous people is a number-twiddling pastime that has obsessed numerologists ever since the Book of Revelation was written. With patience and ingenuity it is not difficult to extract 666 from almost any person's name. For example, using Blevins's Bible code, I discovered that *sun, moon*, and *Pat J. Buchanan* each adds to 666. The same code yields 666 if you apply it to *Hal Lindsey B*, the B standing, of course, for Beast.

"The Second Coming of Jesus," "Notes of a Fringe Watcher" column, Skeptical Inquirer, January/February 2000, p. 11

The steady expansion of scientific knowledge is one of the few aspects of human history–perhaps the only aspect–about which we can say dogmatically that genuine progress takes place. Moreover, the progress itself progresses. The expansion occurs with steadily increasing rapidity.

The Ambidextrous Universe (Scribner), preface to the Second Edition

I continue to be amazed that any professional mathematician would suppose that mathematics has no reality apart from human cultures. I am even more astounded that there actually are physicists who think the moon would not be "out there" if no one (not even a mouse? Einstein liked to ask) observed it.

The Jinn from Hyperspace (Prometheus), introduction to Ch. 9, "A Defense of Platonic Realism," p. 93

If God or the gods, or the Old One (as Einstein liked to call Everything), had a transcendent reason for bringing us into existence, what does it matter whether the first man and woman were formed in one day from the dust of the

continued

ground, as Genesis has it, or evolved over billions of years from the dust of a primeval fireball? The fact that we are here proves that we derive, in some crazy sense, from the fireball, and I for one find this more miraculous than the Genesis story.

A review of Steven Weinberg's book, *The First Three Minutes*, reprinted in *Order and Surprise* (Prometheus), p. 319

For as long as I can remember I have been impressed, perhaps overwhelmed is more accurate, by the vastness of the universe and the even greater vastness of the darkness that extends beyond the farthest frontiers of scientific knowledge.

The Night Is Large: Collected Essays 1938–1995 (St. Martin's Press), p. xvii

We are all little children walking down a road of yellow brick in a crazy, outlandish, Ozzy sort of world. We know that wisdom, love, and courage are essential virtues, but like Dorothy we cannot decide whether it is best to seek for better brains (our electronic computers grow more powerful every year!) or for kinder, more loving hearts.

Introduction to the 1960 Dover edition of *The Wonderful Wizard of Oz* by L. Frank Baum

Martin Gardner quotes compiled by Kendrick Frazier

Martin's brilliance, one day he will.

As close as my proximity to Martin was, I'm sorry I didn't visit him more often—my loss. I've had many favorite issues of the SKEPTICAL INQUIRER over the years. I suspect this issue will climb to the top of my list.

Bryan Farha is a professor at Oklahoma City University, where he coordinates the graduate program in applied behavioral studies, and is editor of *Paranormal Claims: A Critical Analysis*.

The Connoisseur of Paradox

JOHN ALLEN PAULOS

A connoisseur of paradox, Martin Gardner had a fittingly paradoxical career. Although he majored in philosophy and took no mathematics courses after high school, he probably did more to stimulate an appreciation for, curiosity about, and discussion of mathematical ideas than scores of us mathematics professors.

I remember reading his books on recreational math as an undergraduate and being eager to explain the puzzles in them to whoever would listen. In a couple of cases I even used them to win small bets. Over the years we exchanged a couple of book blurbs, a benign log(arithm)-rolling that was a signal honor for me, and we also corresponded a bit about his novel *The Art of Peter Fromm* and other topics, jokes in particular. Once he sent me a letter with some quite funny, quite non-G-rated examples. Later, in the *Scientific American*, he published a very elegant illustration of a religious hoax I proposed based on Kruskal's theorem.

His interests ranged from Lewis Carroll and the philosophy of mathematics to scientific hoaxes and popular culture. Even in his last essay for the SKEPTICAL INQUIRER (March/April 2010) published in his lifetime, he took on Oprah Winfrey's pseudo-cures. A modest man, a clear-eyed skeptic, and an expositor extraordinaire, he was a cogent beacon of sanity to the end.

John Allen Paulos is professor of mathematics at Temple University and author of such books as *Innumeracy, A Mathematician Reads the Newspaper*, and *Once Upon a Number*. He is a CSI fellow.

Characterizing the Hermit Scientist

SCOTT O. LILIENFELD

I had been deeply interested in scientific skepticism for a solid fifteen years before I read Martin Gardner's classic book *Fads and Fallacies in the Name of Science*, first published as *In the Name of Science* in 1952. In fact, for quite some time I had resisted reading it. No book that old, I assumed, could possibly offer much to us today. Moreover, I thought, Gardner's examples must surely be outdated.

Nothing, I soon discovered, could be further from the truth. Indeed, on finally reading *Fads and Fallacies*, I was amazed by how fresh and relevant it is to modern skepticism—and to the psychology of pseudoscience. As all dedicated skeptics know, in this book Gardner delineated the core characteristics of the "hermit scientist," whom we might regard as the prototypical pseudoscientist. For Gardner, the hermit scientist (1) "considers himself as a genius," (2) "regards his colleagues, without exception, as ignorant blockheads," (3) "believes himself unjustly persecuted and discriminated against," (4) "has strong compulsions to focus his attacks on the greatest scientists and the best established theories," and (5) "has a tendency to write in complex jargon, in many cases making use of terms and phrases he himself has coined."

These psychological attributes ring as true today as they did nearly sixty years ago. Although some of the lyrics of the song may have changed (Hollow Earthers, orgone theorists, and Lyksenkoists are no longer central foci of skeptical inquiry), the music hasn't. In contemporary psychological lingo, we might say that Gardner hit upon many of the features of pseudoscientists that predispose them to confirmation bias: the tendency

to seek out evidence consistent with one's hypotheses and to deny, dismiss, or distort evidence that isn't. When one reads Gardner's twenty-five remarkable case studies of thinking gone haywire, it is not difficult to discern a common thread running through their enormous surface diversity: the persistent refusal of proponents of pseudoscience to allow contrary evidence to penetrate their web of beliefs. More than anything else, Gardner's first book is a powerful cautionary tale of the perils of intellectual hubris.

I regard *Fads and Fallacies* as the most significant work in the history of scientific skepticism, as its message remains every bit as pertinent to the vexing problem of pseudoscience today as it was in the 1950s. Gardner's passing gives all of us an opportunity not only to mourn the loss of one of the founders of the modern skeptical movement but to revisit the wisdom and insights he imparted so many years ago.

Scott O. Lilienfeld is professor of psychology at Emory University, editor in chief of *The Scientific Review of Mental Health Practice*, and lead author of *50 Great Myths of Popular Psychology*. He is a CSI fellow and SI consulting editor.

The Friend I Never Met

CHRISTOPHER C. FRENCH

I never had the pleasure of meeting Martin Gardner, but I feel as if I have known him as a friend for decades. Over a long and prolific career, he published over seventy books and countless newspaper and magazine articles. These include his regular column for the SKEPTICAL INQUIRER, "Notes of a Fringe Watcher," which ran for almost twenty years and his "Mathematical Games" column, which ran in *Scientific American* for some twenty-five years.

I cannot claim to have read everything that this great man ever wrote, of course, but I may well have more books on my bookshelves written by him than by any other author. When I try to think back to the first publication of his that I ever read, I simply cannot remember which one it was. Memory is a funny thing, as Martin Gardner well knew, and it feels to me as if his books have been in my life for as long as I can remember, like those really good friends that we all take for granted.

By a process of deduction, I can work out that I must have read his collections of recreational mathematics columns from *Scientific American*, published under such titles as *Mathematical Circus*, many years before I read his skeptical classic *Fads and Fallacies in the Name of Science*. The former books entertained and educated me. They made math fun—at least for a self-professed nerd like me!

But *Fads and Fallacies* had a much more profound impact on me than those stimulating collections of brainteasers. It was one of the first books on skepticism that I read, along with James Randi's *Flim-Flam!* and *The Truth About Uri Geller* and David Marks and Richard Kammann's *The Psychology of the Psychic*. The truth is, dear reader, that until well into early adulthood I was . . . well, I guess I have to come clean . . . a believer in the paranormal! The book that actually opened my eyes to the wonderful world of skepticism was James Alcock's *Parapsychology: Science or Magic?*, but I quickly followed that excellent volume with the skeptical works of Gardner, Randi, Marks, and Kammann.

One thing is notable about all five of these books: they have all withstood the test of time wonderfully. Indeed, all five are still on reading lists for the course on anomalistic psychology that I teach as part of the BSc Psychology program at Goldsmiths College, University of London (along with lots of more recent texts, of course!). But it should be borne in mind that all of those classics but one were written in the early 1980s. *Fads and Fallacies* is now well over half a century old and is still well worth reading. It is, of course, somewhat depressing that most of the fads so devastatingly critiqued in this wonderful volume are still going strong today.

Through these works and others (notably, *Science: Good, Bad and Bogus* and the delightful *Annotated Alice* books), I felt that I did know Martin Gardner even though I never actually met him. I would like to have met him. I am sure I would have liked him. Like thousands of other fans around the globe, I will miss him.

"Martin Gardner is one of the great intellects produced in this country in this century."

–Douglas Hofstadter, author of *Gödel, Escher, Bach*, on the cover of Gardner's *The Night Is Large* (1996)

"For more than half a century, Martin Gardner has been the single brightest beacon defending rationality and good science against the mysticism and anti-intellectualism that surround us."

–The late Stephen Jay Gould, Harvard University, on the back cover of Gardner's *The Night Is Large* (1996)

Christopher C. French is head of the Anomalistic Psychology Research Unit at Goldsmiths College, University of London, and editor in chief of *The Skeptic* (U.K.). He is co-editor of the new book *Why Statues Weep: The Best of* The Skeptic.

Last of the Polymaths

NEIL DEGRASSE TYSON

With a career spanning most of a century, Martin Gardner was the last of the polymaths. Nearly everyone in the skeptic community, across multiple generations, was directly influenced by his writings. As a kid, reading his monthly columns for *Scientific American*, I naively believed that the simultaneous breadth and depth of Gardner's interests was common. Now I am certain it was unique.

Neil deGrasse Tyson, an astrophysicist, is director of the Hayden Planetarium at the American Museum of Natural History and a CSI fellow. His most recent book is *The Pluto Files*.

The Roots of Skepticism

JAY M. PASACHOFF

I have often cited two books as formative of my career: Martin Gardner's *Fads and Fallacies in the Name of Science* (I can picture the cover of the Dover edition, which came out in 1957 while I was at the Bronx High School of Science) and C.P. Snow's *Two Cultures and the Scientific Revolution* (which I bought when it first came out in 1959, at a bookstore in San Francisco while attending a summer math research program at Berkeley—just prior to my starting Harvard as a freshman). In the fifty-plus years since, I have tried to conduct my science, my life, and my career with the ideals of both of those authors in mind: eschewing fads, fallacies, and pseudoscience of all kinds and trying to be educated in both science and the humanities.

A few years ago, I started teaching a seminar at Williams College on "Science and Pseudoscience" to about a dozen juniors and seniors. I started out with C.P. Snow's book and ideas as a frame to the seminar and then had one of the twelve weekly sessions devoted to Martin Gardner's work, with a reading list (and library reserve) that included all of his relevant books. The course has been quite popular, straining the limit of twenty that I subsequently adopted, with students begging to be admitted. The discussions have been lively and interesting. I look forward to next spring's version.

So I am back to my roots in Martin Gardner's important plea for rationality, and I am very grateful to him for his ideas.

Jay M. Pasachoff is the Field Memorial Professor of Astronomy at Williams College, Williamstown, Massachusetts, and a CSI fellow.

A Blowtorch Turned on Jell-O

MARTIN BRIDGSTOCK

Martin Gardner burst into my awareness in the 1960s. I remember myself as a troubled boy in my early teens, mooching through the weekly market in Grimsby, a U.K. fishing port. I picked up a copy of *Fads and Fallacies in the Name of Science* for five British shillings—about 40 U.S. cents in today's money—and read it. Then I read it again, and again. Here was a grown-up with massive intellectual powers focusing critically upon paranormal claims. It was a bit like watching a blowtorch being turned on Jell-O. I was shocked, amused, and delighted. Why wasn't anyone else doing this?

Gardner taught me a lot. First, that all humans, without exception, can be wrong. And since all books, papers, and paranormal theories are produced by humans, they can be wrong too. There is no way out, except to check the evidence and think for yourself. Second, he taught me the importance of clarity in writing through his ability to skewer pseudoscientists with a few words of description or criticism. I am no Gardner, but these messages sank into my bones.

Years later, I discovered Gardner's mathematical column in *Scientific American*. My math was barely good enough to follow the arguments, but Gardner's delight in human inventiveness shone clearly through every paragraph. He loved producing dizzying paradoxes from simple assumptions and throwing light on whole new fields of mathematical thought. It was the other side of his criticisms of pseudoscience: use your mind, and wonders will follow. Obfuscate, and there is disaster ahead.

In a very real sense, Martin Gardner cannot die. Like David Hume, he is a living thinker whose ideas will remain relevant as long as human foolishness persists. Among much else, he was one of the founders of the modern skeptical movement, and his truth really will go marching on!

Martin Bridgstock is a senior lecturer at the School of Biomolecular and Physical Sciences at Griffith University, Queensland, Australia, and author of the new book *Beyond Belief: Skepticism, Science and the Paranormal*. He is a CSI scientific consultant.

Goodbye, Master of Journalists

LUIS ALFONSO GÁMEZ

Martin Gardner was the master for those of us who believe that teaching science should include denouncing bunk. "I have found that one of the best ways to learn something about any branch of science is to find out where its crackpots go wrong," he wrote in *On the Wild Side* (1992). Exactly so. In a world in which so many feel attracted to the paranormal, this maxim should guide the work of journalists who inform the public about science. Too often we have irresponsibly avoided criticizing pseudoscience, considering it undignified.

We should take advantage of flying saucers, Atlantis, extrasensory perception, and creationism to hook the public and teach them to appreciate biology, psychology, geology, history—science and knowledge in general. We should use pseudoscience as the hook to teach science and critical thought. Martin Gardner did it for decades with the clarity of someone who considered himself "basically a journalist." His books are always at hand to consult to remember what he said about so many of the absurdities that surround us.

Today the world is a little darker; reason's flame dims in the darkness because we are without Martin Gardner. We will miss him. I will continue to have him with me daily, as I have since I read him for the first time, as an example of what a scientific journalist must be. Luckily, we have his books to guide us.

Luis Alfonso Gámez is a journalist, scientific consultant for CSI, and author of Magonia (http://magonia.es), the most important Spanish-language skeptical blog. He is a CSI fellow.

What Martin Taught Me

BENJAMIN RADFORD

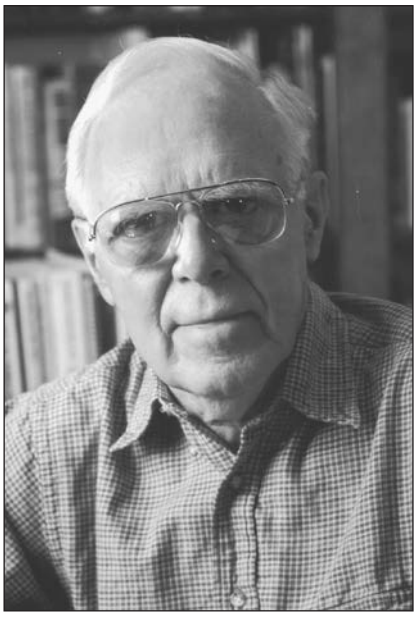
Although I met Martin only once in person, I worked with him as his editor for his SKEPTICAL INQUIRER column for about eight years. When I first started with the magazine, I knew who he was by reputation, but I don't think it was until later, as I was reintroduced to his columns and earlier work, that I really gained a true appreciation for his genius.

I remember getting a column from Martin for the first time. To be honest, I don't remember what the topic was, but I do remember being slightly annoyed. You see, it was typewritten and photocopied (with a few handwritten editorial corrections). I was used to e-mailed attachments and columns submitted on CDs and floppy discs—what was this typewritten stuff? As the years went on I came to treasure and look forward to seeing his three-page, double-spaced columns in the dark black, old-school typewriter font. It reminded me of good, old-fashioned skepticism. It reminded me of notes and letters my grandfather—a veteran journalist and skeptic himself—would write to me when I was a teenager.

One thing I learned from Martin, albeit indirectly, was how skeptical research and investigation can make a real difference in people's lives. It's all well and good to write skeptically about UFOs or ghosts in the abstract, but it's a different matter when you're dealing with real people and real problems.

One day in 2000 I got a call at the office from a man at a payphone somewhere in Arizona. The man had a soft voice—he sounded like he was in his early fifties—and wanted some information on an article he had read a long time ago in the SKEPTICAL INQUIRER but didn't have an issue date or year. "It's an article by Martin Gardner," he said. "It's on a cult." I told him that I'd try to locate the article and issue and forward his call to the front desk where he could purchase the issue, if he wished.

"No, no," he said. "I need it now. Can you fax it to me?"



While I was willing and able to help, it seemed like a bit of a steep request to stop what I was doing, look through two dozen back issues, find the article, and fax it to the man, long distance, at our expense! Besides, I was skeptical that the payphone would be able to receive the fax. And what was the urgency anyway?

The man put another quarter in the phone and explained that he feared that his younger brother was becoming involved in a cult. He was driving out to see his brother and was desperately trying to think of ways to reason with him. He remembered that Martin had written a column on the cult years before and hoped the information would provide skeptical facts and criticisms. He was calling from outside a copy shop with the shop's fax number handy so he could receive the fax there and go see his brother armed with more than just concerns. I hung up the phone, sifted through the back issues on my shelf, copied the relevant pages, and faxed them off. I never heard back from the man; I hope he was able to reason with his brother using Martin's work, and I liked the idea that Martin's keen mind and research might help save a man's life.

I shared this story with Martin last year as I was preparing my latest book, to which Martin kindly contributed, and he

Some of Gardner's Notable Books

. . . About Pseudoscience and Fringe Science

In the Name of Science (1952), republished as *Fads and Fallacies in the Name of Science* (1957)
Science: Good, Bad and Bogus (1981, 1983, 1989)
How Not to Test a Psychic
*The New Age: Notes of a Fringe Watcher** (1998, 1991)
*On the Wild Side** (1992)
*Weird Water and Fuzzy Logic** (1996)
*Did Adam and Eve Have Navels?** (2000)
*The Jinn from Hyperspace** (2008)
*When You Were a Tadpole and I Was a Fish** (2009)

*In part, collections of his SI columns,

. . . About Science

Relativity for the Million
The Ambidextrous Universe
The New Ambidextrous Universe
Great Essays in Science (ed.)

. . . On Other Topics

Mathematics, Magic, and Mystery
The Scientific American *Book of Mathematical Puzzles and Diversions*
The Annotated Alice
The Annotated Ancient Mariner
Aha! Insight
The Sixth Book of Mathematical Games from Scientific American
Mathematical Carnival
Aha! Gotcha
Order and Surprise
The Whys of a Philosophical Scrivener
The Magic Numbers of Dr. Matrix
Knotted Doughnuts and Other Mathematical Entertainments
The No-Sided Professor (short stories)
The Wreck of the Titanic Foretold? (ed.)
Time Travel and Other Mathematical Bewilderments
Gardner's Whys and Wherefores
Penrose Tiles to Trapdoor Ciphers
The Healing Revelations of Mary Baker Eddy
Urantia: The Great Cult Mystery
The Universe in a Handkerchief

was very pleased indeed. Martin kept working and writing and corresponding to the very end of his life. I don't believe in an afterlife, but Martin may have; if he's there, he's certainly earned his rest.

Benjamin Radford is a research fellow of the Committee for Skeptical Inquiry, managing editor of the SKEPTICAL INQUIRER, and author of the new book *Scientific Paranormal Investigation*.

My Reminiscence of Martin Gardner: A Lesson

TIMOTHY BINGA

Back in 2002, I was asked by Barry Karr, the executive director of CSICOP, if I would be able to leave right away on a trip to acquire some materials for the Center for Inquiry Libraries. It was during our annual Summer Institute, and I was supposed to be teaching our students how libraries organize materials that are associated with our various organizations. I didn't think I should go; couldn't we just have the items shipped? Barry told me I would need to go in order to help select the materials and then help box them up, something not uncommon for some of our acquisitions. I again tried to defer; I had things that needed to get done, and couldn't this wait until the fall? Barry told me that Martin Gardner had decided to give us some of his papers and a collection of books, all related to our mission at the Center. I asked him when I could hit the road.

Martin Gardner, "father of the modern skeptical movement," had asked us to select materials from his collection, box them up, bring them back to our Amherst offices, and maintain his collection on all matters of the paranormal, fringe claims, pseudoscience, etc. His book *Fads and Fallacies in the Name of Science* kicked off this movement. He was a founding fellow of CSICOP, a writer for Prometheus Books, and a fellow *Titanic* aficionado (*Wreck of the Titanic Foretold?*, edited and with an introduction by Gardner, and several short stories and other hard-to-find *Titanic*- and ESP-related materials were included in the collection). I was ready to go right there and then.

We made plans, and I picked up boxes and headed out to Hendersonville, North Carolina, in my wife's van the next morning. I drove all day, staying in a hotel close to his home. I called him early the next day and headed over to his house.

He greeted me at the door, took me into his library, and pointed out what items he wanted me to take. We then began to select the various items from his collection.

I was a little put off at first; I had met him once before in Amherst, but he seemed distracted to me, distant, not wholly there while we went through the books. We continued going through the shelves, placing the materials to one side so I could box them up later. He pointed to a couple of filing cabinets, telling me I should take those too.

I finally got up the courage to ask him about the *Titanic*, letting him know I also had an interest. He told me the same things I had gleaned from his book: the coincidences were not evidence of ESP or precognition but a product of the times. Statistically, he stated, the fact that this was all coincidental fell within the realm of possibility. He went on to tell me that there is "something" that makes us all want to believe in something greater than ourselves and that those who believe in ESP and related phenomena use *Futility* and the other works mentioned in his book as examples of these phenomena. He then pointed out the idea of selective memory, where one remembers only the hits, not the thousands of misses, which is why some people believe in psychics; they forget all the misses and remember only the things guessed correctly. In the case of the *Titanic*, there were thousands of stories at the time about ships traveling the Atlantic that did not hit an iceberg (but might have had a Captain Smith).

I asked him why the *Titanic* was so popular for those trying to prove the existence of psychic phenomena. He countered by asking me why I thought the *Titanic* struck such a chord with our culture. Because I had studied this myself, I told him that it was because it marked the end of an age: the disaster hit all the various levels of society at one time (the microcosm of society on the boat), and so many half-truths and myths surrounded the *Titanic*. Everyone could find something they could relate to and would find of interest. He looked at me and said that I had answered my own question.

When I finished packing up the books and loading the van with the cabinets and boxes, I went back in to say goodbye. It was with more than a hint of sadness that he thanked me for taking his materials. It was then that I realized that this was a small part of himself being packed up; he was "downsizing" in preparation for a move (to be near his son in Oklahoma, I found out later). I then thanked him for his donation, telling him that I would take very good care of his books and files. He said, "I know you will." I headed back to Buffalo feeling very fortunate to be able to have shared a little time with him.
(See sidebar, "The Martin Gardner Collection.") □

Timothy Binga is director of the Center for Inquiry Libraries in Amherst, New York.

The Martin Gardner Collection

The Center for Inquiry Libraries at CFI's headquarters in Amherst, New York, have approximately twelve linear feet of papers donated by Martin Gardner. The papers are arranged as created by Gardner himself: three drawers of materials are organized alphabetically by name; the remaining drawers are organized by topic, including all the various fields of skepticism, the paranormal, religious criticism, etc. Approximately 450 books are similarly categorized. No books or papers concerning Gardner's mathematical interests or his *Scientific American* columns are located at the Center, unless they relate to the above topics.

A Skeptic's View of Prevention and Treatment of Heart Disease and Stroke

Notwithstanding the great progress made against heart disease and stroke, there is substantial underuse of effective medical therapy and tremendous overuse of coronary angiography, stenting, and coronary artery bypass surgery.

REYNOLD SPECTOR

Since 1950, death rates from heart disease and stroke (adjusted for age and size of the population) have decreased by 64 and 74 percent, respectively—an impressive result. Still, in 2006 heart disease killed 632,000 Americans (26 percent of all deaths) and stroke killed 137,000 (6 percent of all deaths). The prevalence of chronic heart disease, stroke, and other related conditions in the U.S. adult population in 2006 are shown in table 1 (American Heart Association 2010). *Prevalence* indicates the number of people living with the disease. For comparison purposes, cancer killed 560,000 Americans (23 percent of all deaths) in 2006. It is worth noting that 50 percent of the American population over age forty will develop cardiovascular or cerebrovascular disease—

diseases in whichblood flow through essential arteries is blocked (American Heart Association 2010).

Since 1950, three general approaches to the prevention and treatment of cardiovascular disease (*coronary artery disease* [CAD]) and cerebrovascular disease have evolved:

1. Medical therapy with drugs, weight loss, diet, exercise, and smoking cessation

2. Interventional cardiology or neurology with *angiography* (insertion of catheters into the coronary or carotid arteries and injection of radio-opaque dye to see postulated narrowings [lesions] with X-rays); *angioplasty* (opening of narrowed or plaque-filled arteries with intravascular balloons); and *stenting* (placing a small mesh-work tube to keep the artery open)—often termed *percutaneous coronary intervention* (PCI) to treat CAD or *percutaneous carotid intervention* to treat cerebrovascular disease

3. Surgery with either *coronary artery bypass grafting* (CABG), which "jumps" over narrowed (*stenotic*) CAD lesions; or *carotid endarterectomy* (CEA), which removes the obstructing atherosclerotic plaque inside the carotid artery

However, in recent years, critics of interventional cardiology and neurology, and coronary and carotid surgery—especially PCI and CABG—have emerged (Diamond and Kaul 2008). (In this article I will lump together the various types of PCI with stenting. I will do the same with CABG, which is now sometimes performed without opening the chest.) The critics claim that underuse of effective medical therapy and overuse of these invasive procedures cost tens of billions of dollars in the U.S. per year. In fact, many patients are harmed by unnecessary use of these procedures, as discussed below. It is worth noting that there are approximately 3, 2, and 1 percent procedure-related mortality rates associated with CEA, CABG, and PCI, respectively (American Heart Association 2010).

In this article I will review the current approach to—and the results of the prevention and treatment of—CAD and vascular stroke. Before beginning, however, I must define terms, briefly describe the anatomy and physiology of the heart and brain circulations, and then summarize what goes wrong in the coronary and cerebrovascular circulations in disease (pathophysiology).

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From these considerations, I will explain the scientific hypotheses about what is wrong and why, and the implications for therapy. Finally, I will describe how the clinically operational hypotheses differ from the scientific hypotheses and the real world consequences of these differences. To make these analyses valid, I will use only the highest quality evidence from "gold standard" clinical science (e.g., controlled randomized trials). Moreover, I will judge results on the basis of the effects on patients in terms of heart attacks, strokes, and death—the so-called "hard endpoints."[1]

Table 1

U.S. Cardiovascular and Stroke Summary Statistics—2006

Disease or Problem	Prevalence (%)*
Coronary heart disease†	17.6 (7.9)
High blood pressure	74.5 (33.6)
Stroke	6.4 (2.9)
Heart failure	5.8 (2.6)
Myocardial infarction‡	8.5 (3.6)
Angina pectoris§	10.2 (4.6)
Smoking	48.0 (20.6)

*In millions and percent of population over age twenty, except smoking, for which the prevalence is in millions and percent of population over age eighteen.

†The number of patients having survived a heart attack and/or with angina pectoris.

‡Myocardial infarction (MI) = heart attack with heart muscle damage. In common language, MI is equated with heart attack.

§Pain in chest due to coronary artery disease.

Heart Anatomy, Physiology, and Pathophysiology

The heart and brain require constant blood flow to survive. The left ventricle of the heart pumps blood into the major systemic artery, the aorta, to nourish the body. At the base of the aorta, right and left coronary arteries supply the right and left halves of the heart. These coronary arteries then branch into smaller conduits to supply the entire heart. The blood is driven through the coronary arteries' lumen by higher pressure in the aorta down a pressure gradient. In a normal individual, if these arteries are acutely blocked (e.g., by a clot), the heart tissue downstream (distal) will die due to lack of oxygen and nutrients (i.e., a heart attack occurs). However, in patients with chronic CAD and patchy atherosclerotic narrowing of the artery, a process known as *collateralization* often occurs (see figure 1). Basically, small arteries (branches off the main coronary artery) before a narrowing (*stenosis*) join up with small arteries after the stenosis and carry blood into the post-stenotic artery. (Alternatively, branches from other coronary arteries may also supply the distal region.) This amazing phenomenon explains why some patients may have a totally closed-off (occluded) artery and yet suffer no ill effects—because the collateral vessels supply the distal heart muscle. In one sense, such a "patient" is functionally normal—his heart is perfectly well supplied with blood. Higher up on the

aorta, two carotid arteries (in the front of the neck) and two vertebral arteries (in the back of the neck) branch off on each side to supply the right and left half of the brain.

In coronary artery and cerebral artery disease, four atherosclerotic processes can occur (see figure 1): diffuse narrowing of the lumen due to disease-induced thickening of the artery wall (B), focal narrowing (stenosis) (C), rough plaques (E) on which clots can occur (with sudden interruption of blood flow and a heart attack or stroke), and collateralization (D) if the atherosclerotic process is slow. The collateral shown in figure 1 is larger than most collaterals in living patients.

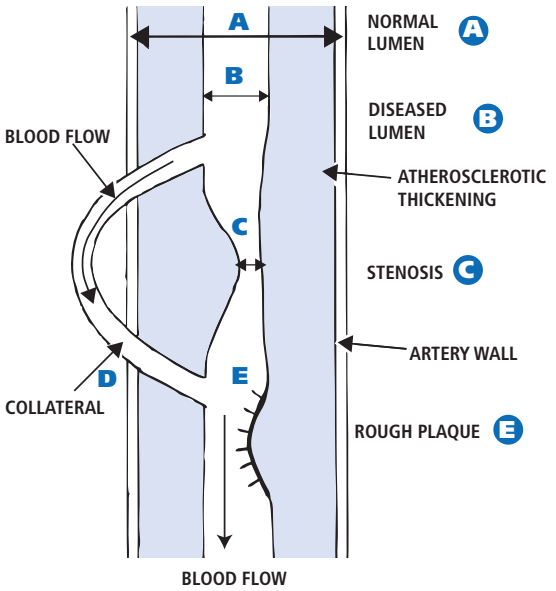

Figure 1. A longitudinal schematic section of a severely diseased coronary artery. (A) shows the normal luminal (interior) diameter; (B) shows the narrowed luminal diameter due to diffuse coronary artery disease (atherosclerosis); (C) shows a severe stenosis; (D) shows a large collateral vessel with blood flow bypassing the stenosis; and (E) shows a rough plaque on which a clot can form. Similar findings occur in the cerebral circulation.

I will now focus on the consequences of obstructive lesions due to atherosclerosis in the heart: In some cases there may be no or minimal clinical symptoms if there is adequate collateralization; *angina pectoris* (cardiac pain in the chest) if there is a severe stenotic lesion that manifests its presence during exercise when the heart muscle requires more blood (the attendant process is called *myocardial ischemia* [lack of blood]); or a heart attack when a clot suddenly forms on a plaque and the distal heart muscle tissue dies. Most heart attacks occur due to plaques that rupture or are very rough, forming a sticky nidus for clot formation and a subsequent cardiac catastrophe (see figure 1). Heart attacks occur less often due to tight stenotic lesions. (Similar processes occur in the cerebral circulation; however, only 20 percent of strokes are due to disease in the carotid arteries and are therefore accessible to surgical or percutaneous interventions.) In the heart, ineffective cardiac pacing or heart stoppage and sudden cardiac death is associated with these atherosclerotic processes, especially if there is an acute closure of a coronary artery. The heart's electrical system (which causes the orderly beating of the heart) and the heart muscle are sensitive to interrupted blood flow.

Pathologically, atherosclerosis is an often patchy thickening and hardening of the arterial wall, as depicted in figure 1. Under the microscope, atheroscerosis is the unnatural buildup of fats, fibrous tissue, and inflammatory cells in the vessel wall. Gradually the tissue "hardens" due to calcium inflow. There appear to be many causes of atherosclerosis (see table 2). However, this is just a hypothesis at present, and the details of the causal mechanisms in an individual patient remain controversial.

Table 2

Putative Causes of Atherosclerosis

1. Excess weight
2. Diet
3. Blood pressure
4. Genetics
5. Cholesterol
6. Smoking
7. Inflammation
8. Aging
9. Intravascular clotting (platelets)

Three Surprising Clinical Facts

Approximately twenty-five years ago, an Iowa cardiology group showed that the degree of stenosis as measured by angiography (injecting a radio-opaque dye into a diseased coronary artery and watching the dye traverse the arterial lumen in real time with an X-ray machine) did not correlate with maximal blood flow to the heart distal to (downstream from) the stenosis (White et al. 1984). In other words, some severely stenotic lesions had normal blood flow on the distal side of the stenotic lesion under conditions requiring high flow, a surprising result. The authors said, "The results of these studies should be profoundly disturbing to all physicians who have relied on the coronary angiogram to provide accurate information regarding the consequences of individual coronary stenoses." Which is to say, these data should have undercut the reliance on the coronary angiogram and degree of stenosis as bases for PCI or surgery, but they did not until very recently (see below).

Second, in past studies of the natural history of angina pectoris, before current medical, PCI, and CABG therapy, several investigators found that the angina spontaneously resolved in 20 to 30 percent of angina patients, presumably due (in many cases) to collateralization (see figure 1) (Fry 1976). This fact must be kept in mind when evaluating clinical studies using angina as an endpoint.

Third, surgery and invasive procedures have a large placebo effect on subjective endpoints like angina pectoris (Preston 1977; Beecher 1961). This result was shown in studies in which "sham" procedures were performed on coronary patients—now considered unethical experiments. But the results were clear—these sham procedures eliminated 40 to 70 percent of anginal episodes. Thus, angina is not a "hard endpoint" for clinical trials of invasive cardiac procedures because the perception of angina is subject to psychological and other subjective factors (Preston 1977). One needs to look at death, heart attacks, strokes, and other hard endpoints (as discussed below) to be certain of clinical benefit.

Table 3

Risk-Factor Modification

1. Normal weight
2. Balanced diet
3. Blood pressure control with diet and drugs
4. Cholesterol control with diet and statins
5. Smoking cessation
6. Exercise
7. In diabetic patients, reasonable blood sugar control

Table 4

Secondary Prevention in Cardiovascular and Cerebrovascular Patients

1. Risk-factor modification as in table 3—all patients
2. Drug therapy—most patients*
    a. Statins (e.g., simvastatin)
    b. Aspirin
    c. Beta blocker (for years after heart attack)
    d. ACE inhibitors (e.g., enalapril)
    e. Calcium channel blockers (e.g., amlodipine)
3. In carefully selected cases, invasive cardiovascular or cerebrovascular procedures, if necessary (e.g., PCI, CABG, or CAE)

*These generally useful drugs are all generic and inexpensive if brand name drugs are not employed. Nitrates remain useful for anginal episodes.

Approach to the Problem

In thinking about prevention and treatment of heart disease and stroke, we conventionally divide prevention into two categories: *primary* (treatment in high-risk patients to prevent disease) and *secondary* (treatment to prevent further disease, such as the use of drugs, procedures, or surgery to ameliorate the disease).

Primary Prevention

In the prevention of heart disease and stroke, *primary prevention* generally refers to modifying risk factors. Primary prevention evolved when the Framingham investigators and others followed up with large numbers of healthy people. The investigators measured hypothesized risk factors like blood pressure and serum cholesterol and observed what happened over time (Dawber 1980). They found that people who had, for example, high blood pressure and/or high cholesterol had more angina pectoris, heart attacks, and strokes. They called these variables (e.g., high blood pressure and high cholesterol) *risk factors*. Subsequently, other investigators showed that lowering blood pressure and cholesterol led to less angina pectoris and fewer heart attacks and strokes, thus proving that risk-factor modification was helpful (see table 3).

These measures are not controversial and are widely acknowledged to be based on sound clinical science. For example, blood pressure control alone has had an enormous impact on stroke and death from stroke. From these data came the *Framingham clinical risk score*, which summarizes risk factors (age, sex, blood pressure, smoking, and cholesterol) (Dawber 1980). Others have added body weight, renal function, and the resting electrocardiogram (EKG). These simple measurements (the Framingham risk score) predict subsequent cardiovascular events and stroke.

Other more aggressive methods to assess risk in patients without symptoms (like screening with exercise testing using EKG changes, cardiac isotope heart distribution studies after exercise or taking drugs, cardiac calcification and/or coronary angiography) add relatively little to the simple and easily obtained Framingham risk score (Scott 2009). Moreover, because of the many false positives and false negatives, these types of tests may do as much harm as good. For example, cardiac angiography has a 0.1 percent in-hospital death rate, 1.3 percent major complication rate, and mean hospital charges of $31,000 (American Heart Association 2010). In other words, no one has ever shown that if you do these tests in asymptomatic patients, the patients are better off in terms of hard endpoints than if you just treat the Framingham risk factors vigorously. Moreover, a recent review of coronary angiography showed just how tremendously overused coronary angiography is in the U.S.—at enormous cost (Patel et al. 2010). The authors concluded that because PCI and CABG do not save lives or prevent heart attacks and strokes in asymptomatic patients more than appropriate medical therapy (but may relieve angina somewhat more in symptomatic patients, as discussed below), it makes little sense to angiogram an asymptomatic patient; by definition that person does not have angina (Patel et al. 2010). In summary, Framingham-type risk-factor modification slows or stops the atherosclerotic process and saves lives; there is no evidence that further testing is useful in the vast majority of patients (Scott 2009).

Primary prevention of severe carotid stenosis with CEA is controversial (see below).

Secondary Prevention

Secondary prevention in the approximately twenty-five million surviving Americans with chronic coronary heart disease and stroke is effective (see table 4). There is little argument about the utility of risk-factor modification (table 3) and drug use (table 4) because these practices are based on a large number of conclusive controlled clinical trials (Wijeysundera et al. 2010). (The drugs in table 4 are typically useful, but the exact drug program must be tailored to each individual patient.) When used in secondary prevention, statins alone cause a 30 percent decrease in cardiac mortality over five years and about a 20 percent decrease in stroke (Scandinavian Simvistatin Survival Study Group 1994). Statins work by stabilizing unstable plaques and preventing clots, thus preventing some heart attacks and strokes; aspirin in secondary prevention decreases intravascular platelet clumping (clotting) on rough plaques and subsequent heart attacks and strokes (Antithrombotic Trialist' Collaboration 2009); and blood pressure–lowering drugs work, in part, by lowering pressure and thus preventing arterial wall damage by excessive pressure. It is worth noting that statins have little effect on the atherosclerotic process per se (Blankenhorn et al. 1993).

What is controversial, however, is the appropriate role of PCI and CABG in secondary prevention. But before discussing this

point, we need to return to the pathophysiology of coronary heart disease. As noted in figure 1, there are four main issues: diffuse atherosclerotic narrowing, rough plaques, focal stenoses, and collaterals. At present, little can be done medically or interventionally about diffuse atherosclerotic coronary narrowing. Second, to prevent heart attacks, one must stabilize rough plaques so clots will not form and suddenly stop blood flow to the distal heart muscle and cause a heart attack. This can be done to a certain extent with statins and aspirin. However, PCI does nothing to stabilize rough plaques. Third, focal stenoses in principle can be dilated and stents put in to hold open narrowed arteries, or "jump" bypass grafts (CABG) can be placed surgically—similar to natural collaterals (see figure 1). In principle, this approach to focal stenoses should be helpful. In other words, to control angina and myocardial ischemia, the cause of angina, one should focus on focal stenoses that significantly impair blood flow (see below). Finally, it is not currently possible to increase the size and number of collaterals.

Notwithstanding these considerations, at present the overriding hypothesis for many interventional cardiologists and surgeons who employ, respectively, PCI or CABG surgery, is that the focus should be on dilating all significant stenoses with stents (PCI) or "jumping" the stenotic lesions with arterial or venous bypass grafts (CABG) irrespective of the functional consequences of the stenosis (Diamond and Kaul 2008). (The work of the Iowa group [White et al. 1984] is ignored.) This philosophy is espoused in the American College of Cardiology/American Heart Association guidelines (Smith et al. 2005). Some critics pejoratively call this *luminology*—excess focus on the anatomical stenosis and not enough focus on functional stenosis; other critics call this approach the *oculostenotic reflex*: if you see a significant coronary or carotid stenosis on angiography, dilate and stent it (PCI) or, in other cases, "jump" it or remove it surgically (CABG or CEA, respectively) (Diamond and Kaul 2008; Pfisterer et al. 2010). (I should note, however, that in the recently updated guidelines, there is somewhat more emphasis on medical therapy [Patel et al. 2009].)

But what are the clinical facts supporting the standard interventional (PCI) or surgical (CABG and CEA) approaches, based on luminology and the oculostenotic reflex? The results are surprising and, on first blush, may seem counterintuitive to some. First, when occluded coronary arteries were opened with balloon angioplasty (i.e., opening severe stenoses or completely closed arteries by blowing up micro-balloons in the stenotic area), collateral vessels substantially regressed during the five months of follow-up (Werner et al. 2003). This shows the dynamic nature of collaterals and the danger that if by ill luck an opened stenotic lesion clotted, there would be insufficient collateral blood flow to protect the distal myocardium, and a heart attack would occur. It is worth noting that many arterial collateral vessels are too small to be seen on routine angiography.

Second, as I have already noted, the presence of even a severe angiographic stenosis does not establish the clinical importance of the stenosis, in part because in many cases collaterals can maintain blood flow to the heart distal to the stenosis (see figure 1).

Third, a large randomized trial in 2,287 patients with widespread heart disease and at least one severely stenotic lesion seen on angiography was performed. This trial compared *optimal medical therapy* (OMT) (see table 4) with OMT plus PCI (the Courage trial) (Boden et al. 2007). After 4.6 years, there was no significant difference in deaths, heart attacks, or strokes (primary events) between the OMT group and the OMT plus PCI group. In fact, there were more primary events (211) in the OMT plus PCI group than the OMT group (202). The PCI added nothing but cost and tribulation. However, 33 percent of the OMT group and 22 percent of the OMT plus PCI group did not do well and required a PCI or CABG later. At one year, 66 percent of the patients in the PCI group were angina free, versus 57 percent in the OMT group ($p < .05$), but this advantage disappeared by three years. Whether this early advantage of PCI on angina is real, or a placebo effect due to the invasive procedure (as I discussed earlier), is unknown. The authors concluded that inexpensive OMT (see table 4) should be attempted in all comparable patients because approximately 70 percent of such patients will do well on just OMT. Thus, the standard interventional approach is not initially justified for such patients with CAD, including those with significant stenosis, in terms of hard endpoints. This is an important discovery because each PCI costs about $51,000 (total hospital costs) (American Heart Association 2010) compared with approximately $500 per year for treatment with generic drugs (at low-cost pharmacies) (see table 4). Two very recent analyses of all the trials comparing stenting versus medical therapy in CAD also concluded that OMT should be attempted first, before consideration of angiography, PCI, or CABG (Trikalinos et al. 2009; Wijeysundera et al. 2010).

What is really missing for progress in coronary artery disease and stroke prevention are better drugs and lifestyle changes to slow or stop the atherosclerotic process.

Fourth, recently, the FAME (FFR vs. Angiography for Multivessel Evaluation) investigators carried out a critical study attempting to improve on the philosophy of just treating stenotic lesions seen on angiography with PCI and stents (Tonino et al. 2009). Like the Iowa group twenty-five years ago, the FAME investigators hypothesized that you should stent only lesions that are functionally important—not those that are just anatomically present. They used a technique called *fractional flow reserve* (FFR) at the time of angiography to select functionally important lesions, and then randomized 1,005 patients to either standard PCI or PCI guided by FFR. The results were surprising to the cardiology community, which has practiced standard PCI for over twenty years. First, the average number of stents placed in the standard PCI group was 2.7, versus 1.9 in the FFR-guided group ($p < .001$). Moreover, the primary endpoint of death, heart attack, or repeat revascularization was 18 percent in the standard group and 13 percent in the FFR group ($p < .05$). There were fifty-five deaths or heart attacks (11 percent) in the standard

group versus thirty-seven (7 percent) in the FFR group ($p < .05$). Thus, with fewer stents, clinically there was a much better result. The authors conclude that stenting stenotic lesions that do not have adverse functional consequences is actually harmful, probably because the stenting breaks off small clots and may clog useful collaterals. A skeptic might reasonably ask: why did it take twenty-five years for someone to conduct a trial like the FAME trial after the Iowa group reported that the degree of stenosis did not correlate with its functional consequences? (Please see discussion about table 5 below.)

Table 5

Explanation for Overuse of Stents (PCI) and Jump Bypass Grafts (CABG)

1. Many interventional physicians "believe" in what they do.
2. Physicians prefer action.
3. Physicians often see cause–effect relationships, even in their absence.
4. Physicians depend too much on personal judgment.
5. When things go wrong, physicians often chalk it up to chance.
6. There are huge economic incentives to perform PCI/CABG/CEA.
7. Patient pressure secondary to medical hype.

Fifth, another controlled trial (Inspire) approached the problem from a different viewpoint (Mahmarian et al. 2006). They took post–heart attack patients who showed ischemia and randomized the patients to either OMT or angiography/PCI. (The post-PCI drug regimen was not quite as intense as with the OMT patients). After two months, there was a comparable decrease in myocardial ischemia in both groups. These results help to explain the Courage study described above—OMT alone is as good as angiography/PCI plus medications in patients with myocardial ischemia.

Finally, the recent Syntax trial compared PCI and CABG surgery in 1,800 patients with major CAD (Serruys et al. 2009). This trial was randomized and the results conclusive. At one year, death from any cause, heart attack, or stroke occurred in 7.7 percent (PCI) and 7.6 percent (CABG) of patients. There were, however, more strokes in the CABG group (2.2 vs. 0.6 percent; $p < .001$). On the other hand, 13 percent (PCI) versus 6 percent (CABG) of patients required repeat intervention, generally PCI ($p < .001$). In summary, on hard endpoints, these Syntax results show that there is no overall advantage of CABG over PCI in severe coronary disease; CABG patients suffer more strokes, but PCI patients require more revascularizations.

In the case of symptomatic patients with severe carotid stenosis, there is clear evidence that CEA is useful in carefully selected patients, as I discuss below.

Interpretation

In clinical medicine, there is general agreement that therapy (either preventive or treatment, as I defined above) must be proven effective and be in the patient's best interest. In other words, the risk–benefit ratio must favor the patient. This is the standard that the FDA and regulatory agencies throughout the world follow for approval of the sale of drugs.

What is absolutely clear is that in both primary and secondary prevention, medical therapy works (see tables 3 and 4) and lessens heart attacks, strokes, and death substantially. Medical therapy is inexpensive (if generic drugs are used), and the risk–benefit ratio for either primary or secondary prevention is strongly in patients' favor. Moreover, the results of medical therapy for CAD are consistent with the hypothesis that heart attacks are generally due to acute clotting on rough plaques, *and* angina is usually due to impaired blood flow through stenotic lesions.

Do PCI and CABG surgery as now practiced—based on opening or bypassing stenoses—appear rational? And do they work? As noted above, just bypassing or opening all stenotic lesions is not helpful (FAME trial). In fact, at least one-third of such lesions should not be stented. Second, at present there is evidence that these procedures are not needed in approximately 70 percent of patients currently undergoing these procedures (Courage trial). Moreover, 21 percent of patients who initially had PCI required a repeat PCI (Courage trial). PCI and CABG, unlike medical therapy, do nothing for rough plaque—the initiating cause for most heart attacks. Thus, the luminology theory (i.e., heart disease and stroke occur due to high-grade stenosis, and all you need to do is fix the stenosis) is extremely incomplete and borders on pseudoscience. Whether CABG or PCI truly improve angina much more than modern optimal medical therapy is open to question because these interventions have a large placebo effect, as I have noted earlier.

It is worth noting the economic consequences of this tremendous overuse of PCI and CABG. In 2006, 1.3 million PCIs were performed in the U.S. at a mean hospital cost of $51,000 each (American Heart Association 2010). Assuming one-quarter are done justifiably for acute indications and three-quarters for chronic heart disease (a conservative estimate), and 70 percent of the latter are not initially necessary (Courage trial), approximately $35 billion per year is spent with no tangible benefit. Similarly, if 70 percent of the 250,000 yearly CABG operations are unnecessary at $112,000 hospital cost per operation, approximately $20 billion is spent on unnecessary CABG surgery. (This assumes that PCI and CABG are equivalent as per the Syntax trial referred to earlier). If this quantity of procedures were not performed, we would also need many fewer surgeons, interventional cardiologists, operating suites, etc. than are currently used.

If the evidence is clear, why is there a disconnect between good clinical science and actual practice? Why is OMT underused in cardiac patients (secondary prevention) and PCI and CABG overused? Diamond and Kaul (2008) offer five reasons, and I would add a sixth and seventh (see table 5). Diamond and Kaul (2008) suggest that if properly designed economic incentives were established, there would be much less PCI and CABG.

The situation with secondary prevention of stroke is somewhat different. In symptomatic patients with severe stenotic carotid lesions, there is clear evidence that CEA is useful (Meier 2010). Moreover, recent evidence reveals that, in appropriate symptomatic patients, carotid stenting after three years yields comparable results to CEA if done by experienced operators, but the long-term utility of stenting remains to be determined (Meier

2010). Notably, fewer cranial nerve injuries and heart attacks occurred in the stented group. In asymptomatic patients with severe carotid stenosis, controlled trial evidence indicates that CEA is slightly better than medical therapy, with 1 percent fewer strokes per year (Chambers and Donnan 2008).

Where Should We Go From Here?

First, we need to employ optimal medical therapy (OMT) more frequently and more intensively (Diamond and Karl 2008) in CAD and cerebrovascular patients. The tremendous decline in cardiovascular and stroke deaths is due, in large part, to primary and secondary prevention (see tables 3 and 4). We need to do everything possible to make sure patients are compliant with these programs.

Second, we need to better understand which patients will benefit from PCI or, if necessary, CABG. There is some evidence that cardiac patients with a major functionally important stenosis (e.g., those with major lack of blood flow on exercise or its equivalent, as measured by exercise-induced EKG changes or other methods) may benefit more from PCI than OMT. However, this is controversial and unproven; the Inspire trial did not find such a difference, but this was not an endpoint trial (Mahmarian et al. 2006). In the Inspire trial, medical therapy and PCI had comparable effects on myocardial ischemia, as noted earlier. However, on hard endpoints, the Inspire trial was too small to record enough deaths or heart attacks to be definitive. If patients who would benefit from PCI or CABG were preselected, progress might be made in the more rational use of PCI and CABG. However, this will not cure the problem of atherosclerosis, rough plaques, clots, and heart attacks. We must also remember that the use of invasive procedures engenders a large placebo effect in angina studies. PCI and CABG will not be major solutions to the vascular problems in table 1, but their use, with further study, can hopefully be rationalized.

Finally, what is really missing for progress in CAD and stroke prevention are better drugs and lifestyle changes to slow or stop the atherosclerotic process. Indeed, as a nation, with the American population increasing in weight and the attendant increase in diabetes, we are going in the wrong direction. (In adult-onset diabetes, weight control is by far the most important modifiable risk factor.) Notwithstanding these worrying trends in weight, the approaches in tables 3 and 4 have been useful for many people. But, as shown in table 1, there is still a huge burden of heart and cerebrovascular disease in the U.S. population. We need to better understand the atherosclerotic process and then intervene to fix it. Current drugs, although useful—or even the future rational use of PCI and CABG—is not the final solution. □

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Note

1. I will not deal with non-cerebrovascular and non-coronary heart disease (e.g., valvular disease). I should also emphasize that acute chest pain (heart attacks) and strokes require immediate medical attention and are not covered in this analysis. Patients with acute chest pain and stroke must seek medical care as soon as possible because there are effective treatments for acute heart attack and stroke. It is worth noting that the risk of sudden out-of-hospital death from cardiac electrical malfunction secondary to heart attack is substantial. In fact, over 300,000 Americans die of sudden cardiac death (within one hour of the precipitating episode) yearly—largely secondary to coronary heart disease (Lloyd-Jones et al. 2010).

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Should Chiropractors Treat Children?

Parents should be made aware of possible risks associated with chiropractic treatment of children, particularly the services offered by "pediatric chiropractors."

SAMUEL HOMOLA

On March 18, 1993, *The Wall Street Journal* published a front-page article dealing with chiropractic treatment of children. Labeling chiropractic as a nineteenth-century philosophy wearing the white smock of science, the article castigated chiropractors for treating children for "legions of childhood afflictions" (Smith 1993).

A year later, on February 4, 1994, ABC's *20/20* aired "Handle with Care," an episode based on secretly videotaped visits to the offices of seventeen chiropractors who treated ear infections in children. All of the chiropractors offered treatment lasting from several weeks to a lifetime. Treatment methods were based on diagnoses ranging from subluxated vertebrae to nutritional deficiency, weak glands, food sensitivity, and a short leg.

Chiropractic treatment of children has not been curtailed by such bad publicity. Today, building on a program that began in 1993, the International Chiropractic Association offers a postgraduate "Diplomate in Clinical Chiropractic Pediatrics" (DICCP) and publishes the "peer reviewed" *Journal of Clinical Chiropractic Pediatrics.* The diplomate program is a thirty-module, 360-plus-hour classroom course that takes place during weekends over a three-year period. There is no hospital training and no contact with diseased or injured children—only a "mandatory observational/training weekend at a chiropractic center for special needs children under multidisciplinary care" (ICA Council 2009).

Both American chiropractic associations endorse chiropractic care for children. In a June 2008 joint press release, for example, the American Chiropractic Association's (ACA) Council on Chiropractic Pediatrics and the Council on Chiropractic Pediatrics of the International Chiropractors Association (ICA) announced that the DICCP is now recognized by the ACA and its council as the official credential for specialization in chiropractic pediatrics (ACA 2007).

Noting increasing public support for chiropractic treatment of children, a January 2009 press release from the ACA offered this observation: "Survey data indicates that the percentage of chiropractic patients under 17 years of age has increased at least 8.5 percent since 1991. . . . Studies are beginning to show that chiropractic can help children not only with typical back and neck pain complaints, but also with issues as varied as asthma, chronic ear infections, nursing difficulties, colic and bedwetting" (ACA 2009).

A trend toward greater use of chiropractic by children has not gone unnoticed by the medical profession. An article in the January 2007 issue of *Pediatrics* (the official journal of the American Academy of Pediatrics) described chiropractic as the most common complementary and alternative medicine practice used by children, who made an estimated thirty million visits to U.S. chiropractors in 1997 (Vohra 2007). In 1998, children and adolescents constituted 11 percent of patient visits to chiropractors (Lee 2000).

Promoting a broad scope of practice for chiropractors who treat children, the ICA Council on Chiropractic Pediatrics offers links to abstracts from chiropractic journals that support chiropractic treatment for a variety of childhood ailments (ICA Pediatrics 2009). Chiropractors commonly claim to have an effective treatment for otitis media, asthma, allergies, infantile colic, and enuresis. While many of the pediatric conditions treated by chiropractors are self-limiting, treatment is offered for such serious conditions as cerebral palsy, epilepsy, myasthenia gravis, uveitis, ADHD, and Tourette's syndrome. For the most part, treatment for all these conditions is based upon detection and correction of vertebral misalignment (*subluxation*) or spinal joint dysfunction (*vertebral subluxation complex*). An article titled "The Child Patient: A Matrix for Chiropractic Care" in the *Journal of Clinical Chiropractic Pediatrics*, for example, stated that "any alteration in form or function in the child may signal the presence of subluxation, and the subluxation may in turn alter the physiology of the child" (Fallon 2005). For wellness and preventive care, parents are advised that children should be checked for subluxations by a chiropractor six to twelve times per year (Fallon 2005).

A 2009 survey of chiropractors and parents of chiropractic pediatric patients, conducted by the International Chiropractic Pediatric Association, revealed that "the indicated primary reason for chiropractic care of children was 'wellness care'" (Alcantara 2009). The reasons given for such care would indicate that normal spines of healthy children are being manipulated for "subluxation correction."

Photograph by Judith Calson/San Jose Mercury News

There is no credible evidence to support the contention that subluxation correction will restore or maintain health or that such subluxations even exist (College 1996; Mirtz 2009). Chiropractic journals publish hundreds of subluxation-based studies supporting chiropractic treatment for children but only a few studies disputing such treatment. Most medical researchers feel that claims based on the chiropractic vertebral subluxation theory do not have sufficient basis to warrant investigation. But such claims should not go unchallenged, especially when they involve treatment of children.

Contrary Opinions

To date, legitimate properly controlled studies have failed to support the claims of chiropractors who treat children for organic ailments. In the case of asthma, for example, a randomized, controlled trial of chiropractic spinal manipulation for children with mild or moderate asthma published in the *New England Journal of Medicine* revealed that "the addition of chiropractic spinal manipulation to usual medical care provided no benefit" (Balon 1998). A randomized, controlled trial of infantile colic treated with chiropractic spinal manipulation, published in a 2001 issue of *Archives of Diseases in Childhood*, concluded that "chiropractic spinal manipulation is no more effective than placebo in the treatment of infantile colic" (Olafdottir 2001). A recent systematic review of randomized clinical trials concluded that "there is

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no good evidence to show that spinal manipulation is effective for [treating] infant colic" (Ernst 2009).

There is evidence to indicate that soft-tissue manipulative techniques applied over the neck area might aid recovery from secretory otitis media (inflammation of the middle ear) by opening the eustachian tube to facilitate drainage of fluids from the middle ear (Mills 2003). Chiropractors who manipulate a child's neck to correct subluxations might provide some symptomatic relief for otitis media by inadvertently stretching the eustachian tube. But the risk of such treatment would outweigh any possible benefit. (Although otitis media is normally self-limiting, it should be kept under observation by a pediatrician who can prescribe antibiotics, if needed, when there is acute otitis media with bacterial infection. Otitis media commonly occurs in children under three years of age. As the child grows older, an increase in the length and angle of the eustachian tube reduces chances of bacteria or viruses traveling from the throat to the middle ear.)

I have always suspected that chiropractors who say they can use their fingertips to feel subluxations in a baby's spine are either deceiving themselves or misinterpreting what they feel.

Considering the implausibility of the chiropractic vertebral subluxation theory, there is good reason to question the ability of chiropractors to diagnose and treat childhood ailments. A correct diagnosis notwithstanding, there is no evidence to support the belief that manipulating the spine of a child to correct vertebral subluxations would be appropriate treatment. A 1993 risk–benefit analysis of spinal manipulative therapy (SMT) for relief of lumbar or cervical pain, published in *Online Neurosurgery*, advised neurosurgeons that "potential complications and unknown benefits indicate that SMT should not be used in the pediatric population" (Powell 1993).

Considering the damage that manipulation might do to cartilaginous growth centers, there is no known justification for using spinal manipulation on an infant or a preadolescent child. Yet, many chiropractors recommend that the spine of a newborn baby be adjusted at birth to correct subluxations. According to the ICA Council on Chiropractic Pediatrics, "chiropractic care can never start too early" (ICA Home 2009).

Generally, pediatricians classify a child as being under eighteen years of age—before vertebral end plate growth is complete. In a child under the age of eight to ten years, the cartilaginous growth centers are too immature and too vulnerable to injury to be subjected to spinal manipulation. There is some speculation that injury to growth plates might result in spinal deformity (such as scoliosis or Scheuermann's kyphosis) as growth progresses (O'Neal 2003). Such injury might not be detectable. "The incidence of subtle growth plate fractures following high-velocity [manipulation] techniques in children is surely under-appreciated because of the occult nature of these injuries" (O'Neal 2003).

The cartilaginous, flexible spine of a child is not as easily injured as an adult's spine under normal circumstances. Referred pain caused by organic disease is not commonly experienced by children. When back pain in a child does occur, it is potentially more serious than back pain in an adult and should always be brought to the attention of a board-certified pediatrician.

Although spinal manipulation has the potential to injure the spine of a child, few such injuries have been reported in the literature. A systematic review of thirteen studies, published up to June 2004, uncovered fourteen significant manipulation-related injuries in children up to eighteen years of age, nine of which were serious (e.g., subarachnoidal hemorrhage, paraplegia) and two of which were fatal (one child died from a brain hemorrhage and another from dislocation of the atlas following neck manipulation). Ten of the injuries were attributed to manipulation done by chiropractors, one to manipulation by a physiotherapist, and one to manipulation by a medical doctor; two injuries were caused by unspecified providers of manipulation. In twenty cases of harm caused by delayed diagnosis as a result of using manipulation, seven involved a delayed diagnosis of cancer; two children died because of delayed treatment for meningitis (Vohra 2007). The incidence of spinal injuries in children is reported to be 2 to 5 percent of all spine injuries (Hayes 2005).

A Questionable Approach

High-velocity, low-amplitude thrusting, commonly used by chiropractors, is usually the type of manipulation that injures a child's spine. Most chiropractors who manipulate an infant's spine may simply use light thumb pressure to "adjust" an allegedly misaligned vertebra, thus reducing possibility of injury. Although such treatment may be harmless, it has no known beneficial effect other than the calming effect of human touch. Some chiropractors may use a spring-loaded stylus or an electrically powered mallet in an attempt to tap vertebrae into alignment. Chiropractors who adjust newborn babies to correct subluxations may concentrate on the upper cervical (neck) area of the spine. The upper neck is more likely to be injured by delivery during birth and is most vulnerable to injury caused by manipulation. Pediatricians have observed that "the most common traumatically injured region of the immature spine is the first and second cervical vertebrae" (O'Neal 2003).

There is no credible evidence that chiropractors are able to find subluxations in the spine of an infant. It seems unlikely that a chiropractor could detect vertebral misalignment by palpating the flexible, cartilaginous spine of an infant through a thick layer of baby fat. I have always suspected that chiropractors who say they can use their fingertips to feel subluxations in a baby's spine are either deceiving themselves or misinterpreting what they feel.

Some chiropractors use surface electromyography, thermography, leg-length checks, or some other questionable device or

approach to locate subluxations. It goes without saying that chiropractors should not expose a child to unnecessary radiation by x-raying his or her spine in a search of elusive or nonexistent subluxations. In Canada, the Alberta Society of Radiology has recommended that radiologists refuse requests from chiropractors who ask for diagnostic imaging of any type involving children aged eighteen years or younger (Editorial 1998).

Of all the claims made by chiropractors, I regard the claims made by those who treat children to be the most problematic. I have always advised against manipulating the spine of a small child or a newborn baby for any reason. Manipulation of the spine of an adolescent child under the age of eighteen should be done in concert with an evaluation and a diagnosis provided by an orthopedist, preferably a pediatric orthopedic specialist. Caring for children is very different from caring for adults and requires a special expertise. Board-certified medical and osteopathic pediatricians are best qualified to provide appropriate care based on a correct diagnosis.

Although spinal manipulation is often recommended as a treatment for back pain, this recommendation does not often apply to children. When the U.S. Department of Health and Human Services published guidelines suggesting that spinal manipulation might be helpful in treating low back pain without radiculopathy (sciatic pain) when used within the first month of symptoms, its recommendations did not apply to children younger than eighteen years of age "since diagnostic and treatment considerations for this group are often different than for adults" (Bigos 1994). An adolescent child might benefit from appropriate manipulation designed to relieve symptoms caused by uncomplicated, mechanical-type back problems, but only if a definitive diagnosis has been provided by an orthopedist or a pediatrician. Use of unnecessary spinal manipulation in the treatment of children up to eighteen years of age for subluxation correction may delay appropriate treatment based on a correct diagnosis.

Some chiropractors believe that manipulating a child's spine will stimulate the immune system and help prevent infection. On September 8, 2009, for example, the *Journal of Pediatric, Maternal and Family Health Chiropractic* issued a press release titled "Chiropractic Part of Swine Flu Prevention Program in Children." The editor of the journal recommended that all children should be checked for vertebral subluxations before and during the flu season: "Since the nervous system has a direct effect on the immune system and because the spine houses and protects so much of the nerve system it is important to have your child's spine checked for any interference" (McCoy 2009).

Such extreme views find support in the basic definition of chiropractic and in official chiropractic publications. The National Board of Chiropractic Examiners, for example, advises that "psychoneuroimmunology has revealed an interrelationship between the central nervous system and immunity (consistent with chiropractic philosophy). . . . By manually manipulating vertebrae into their normal physiological relationship, chiropractic practitioners relieve interference with the nervous system along with accompanying symptoms." Thus, "chiropractic management of childhood disorders primarily consists of adjusting concomitant spinal subluxations and providing specific nutritional advice and/or support and other palliative measures" (Christensen 2005).

All things considered, it's an understatement to say that "pediatric chiropractic care is often inconsistent with recommended medical guidelines" (Lee 2000). Recommendation of any complementary alternative medicine (CAM) therapy that has a risk–benefit ratio that is not acceptable and is not supported in medical literature may make a referring physician liable for negligence if the referral causes harm by delaying necessary conventional treatment (Cohen 2005). For this reason, and with the best interest of children in mind, few physicians would consider referring a child to a chiropractor. □

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Paranormal Beliefs and Schizophrenia

JONATHAN C. SMITH

Are true believers in the paranormal crazy? Few scholars would seriously embrace this extreme characterization. However, there is a type of "crazy thinking" that is worth exploring. Let me explain.

Schizophrenia is a serious mental disorder characterized by distortions in perception of reality, disorganized speech and thinking, and serious deterioration of the ability to function with others. Contrary to popular myth, schizophrenics do not have "split" or "multiple" personalities. Many schizophrenics have auditory hallucinations in which they hear voices. Actually, auditory hallucinations are relatively common even among perfectly normal people. Often, schizophrenics claim their voices and perceptual distortions come from outside sources, like space aliens, CIA operatives, therapists, their mothers, and so on, trying to control their thoughts. Why do such delusions emerge?

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One popular theory is that terrified and confused schizophrenics try to make some sense out of a frightening world by concluding that the voices come from an outside source, like space aliens. At least this explanation reduces some of the anxious uncertainty of not knowing what's going on. When such explanations are challenged or don't fit apparent reality (no flying saucers are found), the patient patches up the false belief so it is still believable.

Logically, there are only a few ways to do this. First, you can conclude you are very special, a truly unique person, the only one who has paranormal abilities that enable you to hear these voices. Second, you can conclude that your voices could be heard by others if some external paranormal force or agency wasn't preventing it. These two explanations may account for why some schizophrenics have delusions of grandeur ("I'm unique and special") or embrace delusional conspiracy theories ("God, fate, negative energies, space aliens, and the CIA are blocking others from seeing the evidence").

I propose that perfectly sane, intelligent, and honest true believers in the paranormal—those who refuse to question or use sensible tools of critical thinking—possess a similar thinking process. For example, Sue might believe that she has been abducted by space aliens. Maybe one night she woke up paralyzed and saw the dark figure of a space creature that stood by her bed, touched her, and took her breath away. Of course, there may be numerous alternative explanations: perhaps Sue experienced a sleep-related hallucination, misinterpreted a shadow, or has faulty memory. Maybe there is a natural explanation, one that current technology can't measure.

However, Sue is convinced that her alien experience is real and can't be explained through science—that it was a paranormal event. Sue looks for reassuring answers. Like the schizophrenic, she has two choices.

One possibility is that she is unique and special. Sue may then seek out others who have had similar experiences and form a unique and special group, something like the "Church of the Abductee." Their core belief is that space aliens have selected them to communicate with the people of Earth. (Every decade or so another odd and occasionally deadly flying saucer cult emerges; one has even become a world religion.)

Alternatively, Sue (and her abductee friends) might favor an external explanation. There are two popular external

explanations: First, scientists see no evidence for abductions because some external paranormal force or agency is getting in the way. Perhaps scientific skepticism or the cold atmosphere of a science lab emits a certain paranormal "negativity" that blocks alien energy or scares the poor, sensitive aliens away. Maybe such skepticism annoys the aliens. Similar explanations are often given for why scientific and objective evidence for paranormal phenomena is lacking. Second, evidence for alien abductions eludes scientists and experts because there is a conspiracy among those in power to keep us in the dark. Who is part of this conspiracy? Perhaps the U.S. government, the CIA, religious authorities, or the scientific community—or maybe even a medical community fearful that doctors would be put out of business if the common man had access to alien medicine. To be consistent, we would have to conclude that if the conspirers were any good, even this would be unclear.

Like the schizophrenic, Sue may be motivated to "patch up" her beliefs when confronted with conflicting evidence. She may spin a never-ending web of ad hoc rationalizations that render her claims unfalsifiable. For the schizophrenic, such efforts help protect against fears of the unknown. Both a paranormal believer and a schizophrenic can create belief systems of exquisite complexity, rivaling ancient charts of astrology and acupuncture. Delusional systems can acquire a life of their own, protected from critical assessment through their own complexity.

Sane, intelligent, educated, honest, and perfectly decent people are quite capable of experiencing profound delusions and distortions. They include your favorite professors, preachers, and friends—even your mother. They can believe in their delusions and distortions with convincing and authentic intensity. These people are not crazy.

Like the schizophrenic, the believer in the paranormal may be motivated to "patch up" her beliefs when confronted with conflicting evidence. She may spin a never-ending web of ad hoc rationalizations that render her claims unfalsifiable.

And the fact that many may have had the same experience proves nothing. One thousand people seeing the same mysterious flying-saucer–like light over Kansas proves nothing. One thousand people seeing the Virgin Mary in a stain on a Chicago freeway embankment (or a grilled-cheese sandwich) proves nothing. People have believed in the curses of witches for many millennia and put hundreds of thousands of "witches" to death. Extraordinary beliefs can have extraordinary consequences.

The schizophrenic may embrace paranormal explanations in a desperate attempt to reduce the terrors of a mysterious medical illness. For those blessed with at least a modicum of sanity, the tools of critical thinking give some chance of remaining grounded in the world as it is. □

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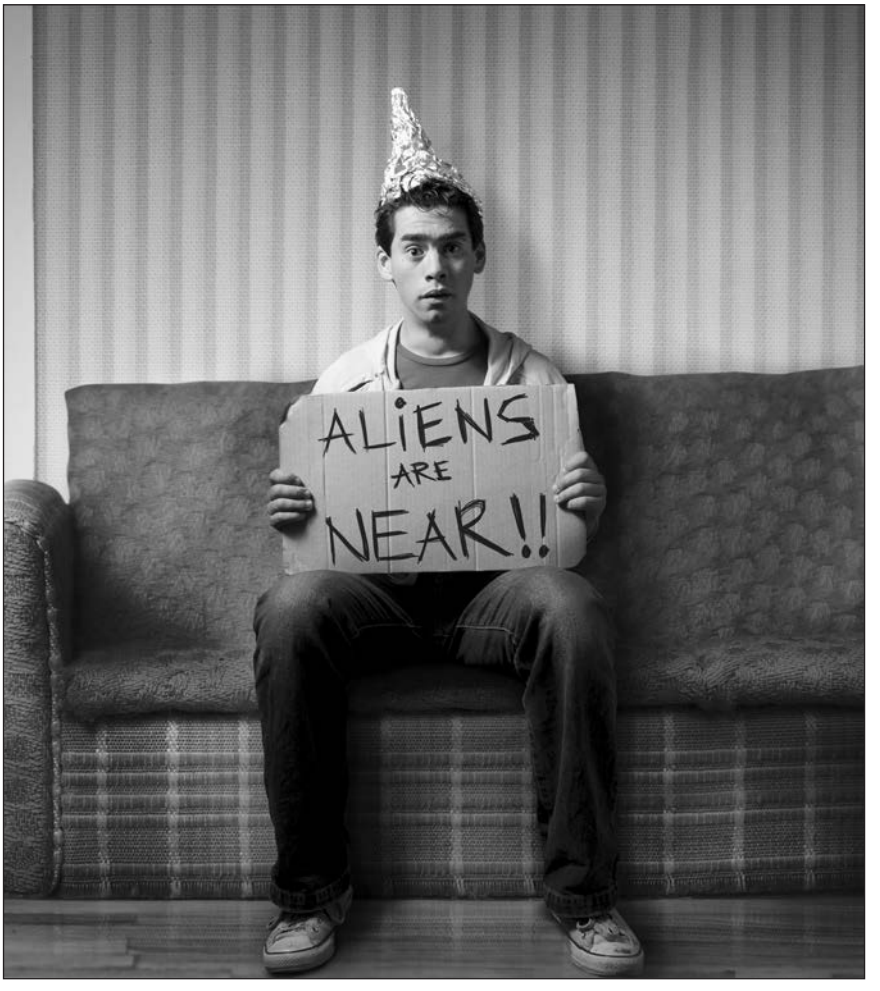
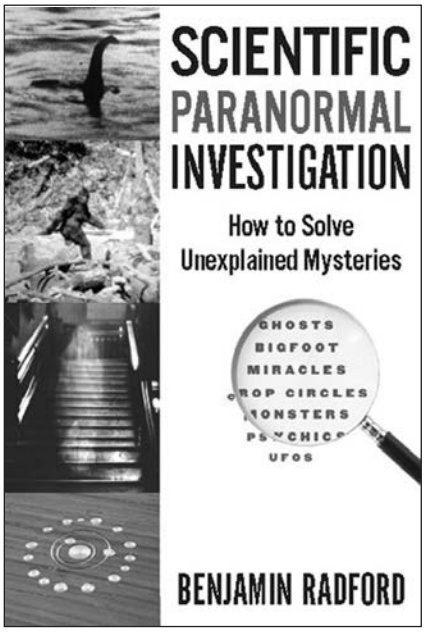


Raising the Bar for Investigating Paranormal Claims

ROBERT CARROLL

Scientific Paranormal Investigation: How to Solve Unexplained Mysteries. By Benjamin Radford. Rhombus Publishing Co., Corrales, New Mexico, 2010. 311 pp. Softcover, $16.95.



In a chapter on how *not* to investigate the paranormal in his new book, *Scientific Paranormal Investigation*, Benjamin Radford jokes that the entire chapter could consist of just two words: *watch television*. He could have advised the reader to pick up almost any book on ghosts, demons, spirits, aliens, lake monsters, crop circles, the chupacabra, or other "strange and bizarre" things. The bar for paranormal investigation in the popular media has been set very low, as evidenced by the overall poor quality of work produced so far. Radford hopes to raise the bar by clarifying and exemplifying the standards that should guide a scientific investigator.

Fortunately, not all paranormal investigations have been of poor quality. Radford, Joe Nickell—the dean of scientific paranormal investigation—and several others have been exemplars for those who wish to properly investigate paranormal claims. A special feature of Radford's book is that it consists largely of case studies he has personally investigated. The reader can see how the principles of investigation are applied to actual paranormal claims. But the main value of Radford's book is that he lays out what should and should not be done in a proper scientific investigation. (Radford regularly reports on his field investigations and other skeptical topics in the SKEPTICAL INQUIRER. He is SI's managing editor and a Committee for Skeptical Inquiry research fellow.)

Radford tells the reader that his book "focuses on the practical aspects of applied skepticism . . . powerful, real-world ideas for critically examining everything from crime scenes to psychic powers to personal decisions." These ideas have been drawn "largely from the scientific process, psychology, criminal investigation techniques, and logic." As such, the ideas Radford explores in the first few chapters have valuable applications beyond paranormal investigations. *Scientific Paranormal Investigation* would be a valuable addition to the library of every journalist and skeptic. But the thousands of people who investigate weird or mysterious things and the millions of readers and viewers who follow their investigations would benefit the most.

I won't relieve the lazy reader of the obligation to read Radford's book by summarizing the principles of a proper scientific investigation. Here I will simply note that the goal of a proper investigation of the paranormal is neither to prove nor disprove any particular claim. Radford puts it this way: "Good science is not about advocacy; while all scientists have their biases and pet theories, their ultimate loyalty should be to the truth." If you set out to prove or disprove the existence of a ghost at a particular location, you are not doing a scientific investigation. If the show you are watching or the book you are reading does not consider alternative hypotheses, it is not conducting scientific investigation. If an author claims that the subject of his attention or investigation is "beyond science," you're dealing with mysticism, not mysteries. Paranormal claims may mystify us, but if they are truly beyond science then they are beyond our ability to know or under-

stand them. A book or film on such topics would be very short, unless it contains much speculation and storytelling. Paranormal claims are investigated precisely because they both mystify us *and* present themselves as mysteries we can hope to solve.

Unfortunately, too many people who try to *investigate* rather than validate or debunk paranormal claims are unprepared to do a proper investigation. They may have good intentions, but the road to error is paved with good intentions. Having the right tools is essential, but as Radford makes painfully clear, you can't buy the most important tools you need. You can't pick them up in a weekend training session. It takes years of hard work to develop the knowledge and skills needed to be a scientific paranormal investigator. Contrary to what you might see on television, an abundance of scientific gadgets is not as important as knowledge of the subject, knowledge of psychology, good logical reasoning skills, and an open mind.

Radford's book does what a scientific paranormal investigation should do: it helps the reader distinguish the real thing from the fake. □

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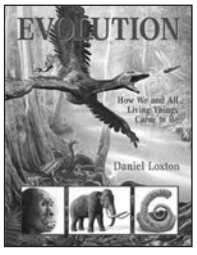


A Gifted Writer and a Book Worth Giving

HARRIET HALL

Evolution: How We and All Living Things Came to Be. By Daniel Loxton. Kids Can Press, Toronto, 2010. ISBN: 978-1554534302. Hardcover, $18.95.

It's hard to believe that we still have so many evolution deniers among us. Understanding evolution is essential to understanding modern biology as well as a host of other subjects. We need to get to young minds before their neurons have a chance to congeal into unscientific ideologies. Now we have just the book to reach them.

Daniel Loxton is the editor of the "Junior Skeptic" section of *Skeptic* magazine, where he makes skepticism and critical thinking accessible and entertaining to the younger set. He has expanded one of his "Junior Skeptic" subjects into a superb new book on evolution.

The illustrations are colorful, informative, and whimsical. Loxton introduces us to a blue bird that compromises on a tail that is "not too long, not too short," some cute "Zooks" that move away and eventually lose the interest and ability to mate with the others, a boy overrun with bunnies that have reproduced without anything to limit survival of the offspring, and some really cool dinosaurs. They're a joy to the eye, and the text is a joy to the mind.

Loxton covers the basics of evolutionary theory; tells the story of Darwin, the *Beagle*, and the finches; and answers the questions people commonly ask:

"But have we ever actually seen a new species evolve?" Yes, both in the wild and in the lab.

"Where are the transitional fossils?" Everywhere.

"Didn't they find some human footprints together with dinosaur footprints?" No, they made a mistake.

"How could evolution produce something as complicated as my eyes?" Loxton shows us how complex eyes gradually developed from simple light-sensitive cells.

"How could walking animals turn into flying animals?" Perhaps from gradual alterations in tree-dwelling, gliding animals.

Then the hard questions: "How did life start in the first place?" Evolution doesn't explain the origin of life, just how it changed over time. We don't know how life got started, but scientists are working on it.

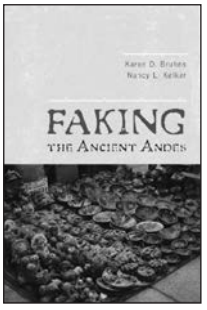
And "What about religion?" Loxton handles this neatly by saying that this is a question science can't help with. He refers readers to their "family, friends, and community leaders." (He avoids mentioning rabbis, imams, priests, or Flying Spaghetti Monsterologists.)

Loxton has a wonderful knack for simplifying without condescending and for challenging young readers to grapple with complicated concepts. The book is aimed at eight–to thirteen-year-olds, but it could be useful to even a sophisticated old coot. Some of his examples might come in handy in your next discussion with an intelligent design believer or a fence sitter. I loved his illustration of how evolutionary change is not a totally random process but builds on patterns that were already there. He describes how hot-rod builders can lift a car, drop it, chop the roof, and slap on new paint, but they are still stuck with the basic pattern of a body and four wheels (not two or seventeen).

If you have children or grandchildren, this book would be a great way to introduce them to the theory of evolution. If you don't, you still might want to buy a copy, read it yourself, and donate it to the local public or school library.

I hope Loxton will write many more books like this on a wide variety of skeptical subjects. He has a gift, and we are fortunate that he is sharing it with us. □

Harriet Hall is a physician and SI contributing editor who writes prolifically about pseudoscience and questionable medical practices.



The Faked Artifact Business

CAROL HAYMAN

Faking the Ancient Andes. By Karen O. Bruhns and Nancy L. Keller. Left Coast Press, Walnut Creek, California, 2010. ISBN: 978-1-59874-395-1. 192 pp. Paperback, $29.95.

Faking the Ancient Andes by Karen O. Bruhns and Nancy L. Keller is a call for anyone associated with ancient art to refrain from actively encouraging the wholesale destruction of the world's artistic heritage. What does it matter to the average museum visitor that much of what is on display is less than genuine? Everyone who looks the other way is contributing to the pollution of scholarship and distortions of history and science. Looting and forgery go hand in hand, destroying cultural patrimony for profits. Both are driven by the desire of collectors to have something ancient and the excuse of Western museums that the countries of origin can't protect their heritage. It is true that many local museums are desperately underfunded, but much of what disappears from a country is driven by collectors' personal acquisitiveness.

I worked briefly at a museum in Arica, northern Chile, in 1991. The museum was filled with textiles from mummies from the surrounding area of the Atacama Desert that were well preserved because it never rains there. In pre-Inca times, the local population wore lavishly dyed and woven garments. (After the Inca conquest all the decorated textiles were sent to Cuzco for the emperor, and the locals had to wear undecorated plainweave garments.) Part of the local style were some unusually constructed square hats. The director, Lilliana Ulloa, then at the University of Tarapaca, described how the museum had been broken into and their collection of hats stolen. They later showed up in a glossy catalog from a California museum.

Some feel that the market in forgeries lessens the pressure on archaeological sites, but it is all part of the same problem. Forgeries authenticated by so-called experts end up in collections and museums, confusing casual visitors and future scholars alike. Misled scholars will create an imagined, fraudulent history. The huge sums of money paid for looted or forged pieces perpetuate the industry.

There are all manner of forgeries: fake ceramics, gold objects, wood carvings, and textiles. Some are entirely new creations; some are new ceramics created from authentic old molds using clay from the original sources, then aged in chicken manure; some are new designs carved from ancient wood or new wood chemically aged; and some are all kinds of ancient broken bits and pieces glued together to make something more attractive to a collector. Where does restoration end and forgery begin? And who can blame the potters who are making pots in the traditional way to support their families? Dealers increase the value and profit mightily for themselves when they pass the goods on to the eager collector. The potters sometimes know they are being cheated by the dealers, that their creations gain tremendous value after they leave their hands, but often have no legal protection and need the money. If the potters sign their work, the identifying marks can be sanded off. Some artisans probably knowingly make forgeries, a practice that began at least as early as the conquest, when the Spanish clergy urged the natives to give up their idols. To avoid punishment for failing to hand them over, the local potters produced new pieces.

Bruhns and Keller describe the workshops of several of the families producing ceramics known to have been authenticated as ancient, which have ended up in museums and galleries. Some of the craftspeople have been trained at the Bellas Artes in Lima and schools abroad. Their work was intended as replicas and may even have been signed, but they have no control over it after it leaves their hands. Although the work can be finely designed and crafted, it cannot receive the recognition it deserves because museums and collectors will not pay for modern interpretations; they want only the old stuff.

In the Indian Market in Lima, I bought one of the Nazca pieces illustrated on page 97 of Bruhns and Keller's book, described there as being sold and bought as a genuine antiquity. In Ica, I saw for sale in a museum shop what I now believe must also have been a piece by one of the artists mentioned in the book. They were anomalies because Ica had almost no crafts for sale, and these pieces were impressive in both price and quality. Sadly, I wasn't tempted to buy one because the price was so much higher than for the ceramic items in the markets in Lima.

It is a pity that so many of these forgeries are taken seriously. Bruhns and Keller do a good job of explaining why. There is tremendous pressure and incentive throughout the museum industry to pass off these fakes as genuine. The authenticators earn a percentage of the appraised value of an object when it is sold, not a flat fee. Authentication is often based on intuition, not science. Scientific technology, where available for dating, is expensive, cumbersome, often requires a bit of the item to be destroyed for data, and can be fooled by the genuine bits in a pot that is a collage of restored shards. Museums often don't want to know the number of forgeries in their collections, and looted pieces come with a dubious provenance. Curators are unwilling to acknowledge fakes in their collections because the public would

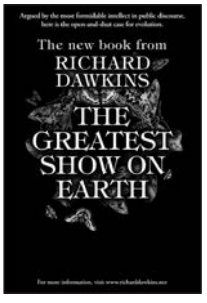
Carol Hayman is a professor of anthropology at Austin Community College. She takes students on a study abroad program to Lima, Peru, every summer.

lose faith in the museums, reputations would be tarnished, and donors would stop donating. Bruhns and Keller also mention the somewhat racist idea that "primitive" art isn't real art anyway.

The book gives numerous references to art books and museum and auction catalogs, but few are reproduced; perhaps they were refused copyright permission. The index and references could be more extensive, and the book contains some omissions. For example, the authors say that "there is a giant and rather hilarious literature on the supposed uses and beliefs surrounding mirrors" (p. 151), but they don't inform readers where to look for it for our amusement; the authors also write that the "idea that Spondylas was brought to southern Peru by shaman-traders is also ludicrous, given what is known about the structure of exchange in ancient Peru" (157). Well, what *is* known about exchange back then? Inquiring minds would like to know.

Faking the Ancient Andes will appeal to readers of the SKEPTICAL INQUIRER because the authors come down firmly on the side of science. In addition to the fine art market, they offer a discussion of the "lunatic fringe of collectionism." This profitable market caters to the demand for artifacts showing humans, dinosaurs, and extraterrestrials as contemporaries, as well as the extreme diffusionists who wish to prove that the Chinese, Welsh, or a lost tribe of Israel reached the new world before Columbus. It is an industry supported by the credulous.

There is a companion volume on Mesoamerica that is probably equally enlightening. A final word of advice from the authors: "As you stare longingly at … the dazzling golden artifact in the dealer's window, stop and think for a moment before you buy it. If it is authentic, you are as much a graverobber as the huaquero who dug it up, and if it's not, then you are about to be swindled. Wouldn't you really rather buy a nice Andy Warhol?" (17). □



Elegantly Explaining and Extolling Evolution

JAMES CRISLER

The Greatest Show on Earth: The Evidence for Evolution. By Richard Dawkins. Free Press, 2009. 480 pp. Hardcover, $30.

Richard Dawkins is known as arguably the greatest living popularizer of evolution. His magnum opus, *The Selfish Gene*, influenced a whole generation of scientists and freethinkers, while works such as *The God Delusion* are at the pinnacle of esteem for atheists who may be struggling to find their way out of the closet.

Dawkins's newest book, appropriately titled *The Greatest Show on Earth*, introduces the concept of evolution to the general public. With recent books such as Jerry Coyne's *Why Evolution is True*, Daniel Loxton's *Evolution: How We and All Living Things Came to Be*, and Donald Prothero's *Evolution: What the Fossils Say and Why It Matters*, it seems almost a rite of passage to communicate the vast set of ideas and evidence about evolution to the public in simple, comprehensible terms. Dawkins has his own "patterned" way of making even the most complicated concepts understandable. With the gut-wrenching over-abundance of evolution deniers in the United States, it is nice to see the scientific community at its best in combating such myths.

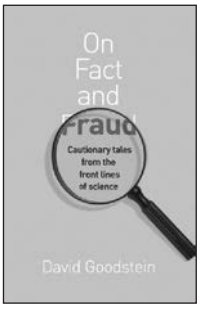
The greatest show on Earth is, without a doubt, evolution. Dawkins entices the reader into subjects including genetics, embryology, paleontology, anatomy, and molecular biology, explaining every commonly held myth about evolution. Dawkins refers to evolution as a fact and playfully uses the word *theorem*, borrowed from mathematics, in place of the seemingly contentious word *theory* when referring to facts that no ordinary person would deny, such as the theory of gravity.

Dawkins discusses the complexity of Richard Lenski's research; almost every major mechanism for adaptive evolutionary change is demonstrated by Lenski's work in building phylogenetic trees through molecular genetics. Just as impressive is Dawkins's case for "bad design" in nature (the opposite of what you would expect from a benevolent creator), in which he contrasts the process of natural selection (which entails modifying the materials already present) with the process of building an airplane from scratch. A notorious example of "bad design" offered by Dawkins is the male urethra passing through the prostate gland, resulting in frequent blockages.

What may be the most enlightening chapter of the book is ironically titled "There Is Grandeur in This View of Life," after Charles Darwin's lyrical crescendo. Dawkins dissects each line of this peroration while further imprinting the main concepts of evolution into the reader's mind. Bits of this dissection include the irrelevance of morality to evolutionary discussions, the lack of need for an omnipotent designer, the descent of all living things from a single ancestor, the fact that organisms are fixed to the environment, and the evolution of evolvability.

Dawkins notes that his book is not only for evolution deniers but for all academics and nonacademics alike. It is also aimed at those who could use more thought-provoking material with which to educate friends and family about the marvels of evolution. Dawkins does not disappoint. I highly recommend *The Greatest Show on Earth*. □

James Crisler is a graduate student at Wichita State University. He conducts research with halophilic bacteria.



When Scientists Go Awry

PETER LAMAL

On Fact and Fraud: Cautionary Tales from the Front Lines of Science. By David Goodstein. Princeton University Press, New Jersey, 2010. ISBN: 978-0-691-13966-1. 168 pp. Hardcover, $22.95.

Concerns over the integrity, or lack thereof, of scientists periodically rise to the level of a public issue. The continuing debate over global climate change has included charges that some scientists who have concluded that human behavior is a significant cause of global warming have selectively presented only data and arguments that support their presuppositions. In the midst of that furor, a December 2009 Rasmussen Reports poll found that 59 percent of Americans think it is "somewhat likely" or "very likely" that climate scientists have falsified data to fit their own opinions about global warming. (Subsequent investigations determined that the accusations were unfounded [see SI, July/August 2010].)

In May 2010, the doctor who convinced millions of parents worldwide that a common vaccine for children could cause autism was barred from practicing medicine in his native Britain. The doctor's peer-reviewed study in the respected journal *The Lancet* was widely discredited when it was found to be based on unethical behavior, and other studies found no link between the vaccine and autism.

David Goodstein has been a professor of physics for more than forty years at the California Institute of Technology, and in 1988 he became Caltech's vice provost. *On Fact and Fraud* focuses primarily on cases in which Goodstein was involved during his career. Caltech's Policy on Research Misconduct, which he drew up, is included as an appendix.

It is important to be aware that fraud in science, regardless of whatever other negative connotations it may have, is a violation of the scientific method.

In almost all recent cases of scientific fraud, three motives have been present. Career pressure is a motivating factor. Goodstein stumbles when he asserts that "all scientists at all levels, from fame to obscurity, are pretty much always under career pressure" (p. 4). It seems that he is unfamiliar with the many institutions of higher education at which, once tenure is secured, many faculty feel no publishable research pressure at all. In fact, at some institutions faculty are encouraged to focus on teaching and service and may even be discouraged from spending time on research. And further on, Goodstein acknowledges that faculty who do not have positions at research universities often opt out of research (22).

A second motive for fraud is "knowing the answer," which refers to those who think they know how the research would come out if it were actually done properly; they decide that it is not necessary to go to the trouble of doing it properly.

If a scientist believes that his or her fraudulent research is very unlikely to be repeated by others, this factor may motivate the scientist to submit it for publication. Goodstein points out that studies are seldom repeated by others, and in biology exact reproducibility of results is often thought impossible.

Two important components of the scientific research enterprise are the reward system and the authority structure. The *reward system* deals with scientific glory, fame, and reputational immortality. Goodstein outlines the eleven steps leading to the pinnacle of the reward system. The *authority structure* involves power and influence.

The first of the cases of alleged fraud or misconduct Goodstein describes is that of the physicist Robert A. Millikan. Millikan was accused of cheating with respect to data he published and then lying about it.

At Caltech in the late 1980s, two apparently unrelated instances of research misconduct in one of its biology laboratories surfaced. In one instance, Vipin Kumar had faked a figure in one of his published articles and also made misleading statements in another published article. Kumar was fired from his postdoctoral position. The other researcher, James Urban, disappeared from the scientific scene.

The high-profile case of virologists Robert Gallo and David Baltimore illustrates, Goodstein says, the poor attempt by the federal government to address scientific misconduct. The question regarding Gallo was whether his lab had wrongly claimed credit for discovering the AIDS virus. A colleague of Baltimore was accused by a postdoctoral student of falsifying data that were published in an article of which Baltimore was listed as one of the authors. But Baltimore himself was never charged with any wrongdoing. Neither Gallo nor Baltimore was found guilty of misconduct.

Many readers will doubtless recall the media coverage of Martin Fleischmann and Stanley Pons's announcement in 1989 that they had induced nuclear fusion reactions on their laboratory bench—cold fusion. Others raced to replicate the achievement but could not do so. Within a matter of months, the claim was discredited. Goodstein discusses whether Fleischmann and Pons were guilty of scientific misconduct or self-delusion.

Two cases of high-profile cheating in physics, by Jan Hendrik Schon at Bell Labs and Victor Ninov at Lawrence Berkeley National Laboratory, conclude the examples of scientific cheating or misconduct. Schon and Ninov were

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found to have published false data a number of times.

The last case Goodstein considers is that of Karl Alexander Muller and J. Georg Bednorz, who in 1986 were working in a field about which most researchers had given up hope; they discovered high-temperature superconductivity. Their discovery was first greeted with some disbelief but then accepted when replicated by others.

Goodstein says the "take-home lesson in all of this is that scientific fraud consists of an explicit and well-defined act: faking or fabricating data or plagiarism" (132).

This book is accessible to the general reading public, although some readers may not be very interested in the descriptions of some subjects, like high-temperature superconductivity. □

The Meaning of Life

RICHARD CARRIER

The Nature of Existence. Roger Nygard, director. Roger Nygard and Paul Tarantino, producers. Walking Shadows. 93 minutes.

The Nature of Existence (whose tagline is "Every mystery of human existence . . . explained in one movie!") is a new documentary by Roger Nygard, who brought us the charming documentaries *Trekkies* and *Trekkies II* (both of which I highly recommend). He has a reputation for treating his subjects respectfully but with kind-hearted humor, and he lives up to that reputation in this film. He traveled all over the earth posing to wildly diverse people the question "What's the meaning of life?" along with various other questions that came up, from the purpose of sex to the basis of morality. This film has pleased some and disappointed others. I can say that while it has its flaws, it also has its virtues and uses.

First, the bad: I found his trek completely disorganized and random. Though after a second viewing (and rethinking conversations I had with him when he interviewed me for the documentary a few years ago) I realized that was partly the point; what he *found* was completely disorganized and random. The movie reflects humanity. Also, no conclusions are drawn and no loose ends tied up. It's a film without a resolution or any coherent theme other than the obvious: there is so much overconfident disagreement on the most fundamental issues of life that humans clearly need to get a clue. Though one major defect of the film is that it doesn't explore *why* anyone believes what they assert in the movie (more on that below), it's evident from what *is* presented that most of these people (which means *most people*) pay little attention to evidence and logic when deciding what the answers are. I also wanted to hear more about how he found and chose the people he interviewed. The collection is surprising, ranging from Mormon sci-fi author Orson Scott Card to unheard-of gurus in India to nuclear physicists at Oxford and wildly beyond. But clearly with so much to show, elements of backstory had to be sacrificed.

Now the good: *The Nature of Existence* is more intelligent than *Religulous* and nicer than *The God Who Wasn't There* with dryer, kinder humor. It's also more respectful of its subjects and their faiths (with some well-deserving exceptions). This film is tailor-made to be enjoyed by believers as much as nonbelievers and thus won't please religion-bashers. Nygard lets people of a dozen different faiths simply speak for themselves without any Michael Moore "gotcha" tactics, and he leaves the audience to draw their own conclusions. Nygard captures the views of religious fanatics, scientists, and even a seven-year-old girl. And not just Westerners—he travels to India and China, too. It's a snapshot of humanity.

I am quoted once in the film (very briefly). Nygard found me because I wrote the popular underground book *Sense and Goodness without God*, in which I confront the meaning of life from a godless perspective and advocate constant questioning, exploration, and answering of the big questions, from which Nygard's film takes a cue. My book takes a scientific and philosophical approach that is systematic and comprehensive. Nygard's film takes the approach most people actually take: asking the self-proclaimed experts of different views what they think. That's not to say that many actually travel the world to do this (as Nygard astonishingly does—pay close attention to how global this film is and ponder what it took for Nygard to make it). But most people do something similar, on a local level, via the Internet and multicultural reading. Their experience is likely to be as shallow as this film. But like this film, there is a great deal of depth under the surface waiting to be explored. After you know other views are out there, you can never go back to thinking yours is the only way of thinking.

And that's this film's biggest asset. You will see and hear more opinions from more diverse people on the big questions of life than you likely ever would have otherwise, even by copious reading. And most seem as sane (or as crazy) as everyone else. You'll often see yourself in these others who think entirely different things. It will force you to ask: are you just like them? If all these people are wrong (and because they disagree, almost all of them have to be), odds are, you are wrong too. So how do

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you really know you're the lone exception, the only one who just happens to be right? That's exactly the question posed by *The Christian Delusion*, a new book from Prometheus Books edited by John Loftus (and to which I contributed two chapters), which came out just in time for *The Nature of Existence* to prove its point: you have to seriously question whether you are that exception or just another human in error. And you can't answer that by simply asking experts what they think because they all think something different. You thus need a method that can tell the difference, and you need to apply it. Nygard doesn't do that. He just puts a mirror up to humanity and reveals the problem. Hence it's a movie I would feel comfortable recommending to religious friends and family. They won't be put off by it. They'll even like it. Yet it will haunt them for years.

After I saw the film, I asked Nygard why *The Nature of Existence* didn't ask the question I kept asking as I watched it: *why* do they believe that? I know he has answers in the can (he has several hundred hours of footage that include answers to that very question). There is some additional footage available on the film's Web site (www.thenatureofexistence.com), which may become extras in the eventual DVD release. But the movie doesn't tackle the *why*. Nygard says that if this film is successful, a sequel will explore that next level. For now, *The Nature of Existence* just looks in the window to see what's there. □

LETTERS TO THE EDITOR

Skeptical Inquirer
THE MAGAZINE FOR SCIENCE AND REASON
Why Our Brains Believe
Brain Science, God Science
By Michael McGuire and Lionel Tiger
How Religion Resists Science
Special Report: Did a Cosmic Impact Kill the Mammoths?
Genetic Algorithm Beats Intelligent Design
Hormone Replacement Therapy: A New Look
Power Balance: Pseudoscientific Silliness

Our Brains and Beliefs

I enjoyed the interesting but poorly argued piece by Michael McGuire and Lionel Tiger on why religion endures ("Brain Science, God Science," SI, May/June 2010). (I leave aside their speculations as evolutionary psychologists regarding both the origin of religion and the nature of the brain.) According to them, religion will endure "as long as life generates problems" because religion provides answers and relief to problems. This would make sense only if there were some problems that must be resolved and if religion were the only way to resolve them. The only problems the authors discuss that seem remotely related to the category of "problems that must be resolved" are what they call "the malady of nothingness" and the problem of living with uncertainty. The only unique thing religion offers as a solution to these problems is the promise of an afterlife.

The authors don't prove that the promise of an afterlife is the only way to resolve these problems. How could they? There are dozens of ways that humans have found to deal with the uncertainties of life. Hope for an afterlife is just one of those ways. Furthermore, nothingness isn't a malady but a solution to a problem for many people: the problem of living a few more years without hope of recovery from the torments of injury, disease, or the ravages of old age. There is no reason to believe that religion's promise of an afterlife won't one day be seen as an obstacle to solving the most pressing problem humans have ever faced: the problem of living in a body for dozens of years beyond the point where life can be said to have any meaning.

The part of the article I found interesting was the part that discussed the various physiological effects of positive socialization. Again, however, the authors fail to establish any necessary connection between these effects and religion.

Bob Carroll
Davis, California

I agree with the authors' basic notion that the success of religion is closely related to the organization and chemistry of the human brain. But I take issue with the notion that religion is the result of the fear of death and the desire for an afterlife.

Many western classical religions such as those of the Greeks and Romans, and even Middle Eastern religions such as ancient Judaism, did not emphasize the afterlife. To them the dead descended into Tartarus or she'ol and lived a dreary, uneventful existence—not something that anyone would desire. Nor did early forms of these religions promise the average person a rewarding life after death. These ideas developed toward the height of the Roman Empire and got their greatest impetus with the birth of Christianity.

The original purpose of superstition and religious ritual was to ensure survival in this life. It was to promote the abundance of game, survival from illness, human fertility, and later the fertility of the fields and the cooperation of the weather. In times when men lived at the mercy of nature, these things were more important than what happens after death. Indeed, many primitive people have rituals to insure that the dead stay dead.

The historically new religions such as Christianity and Islam used the idea of the afterlife as a recruitment tool. Only the adherents had a chance at a rewarding afterlife; all others were to be punished in Hell. At the same time, Judaism also adopted some of these ideas, although the Jewish religion does not condemn all nonbelievers to Hell or reserve Heaven for believers alone.

Jerry Hershberg
Torrance, California

McGuire and Tiger summarized the evolutionary pressures that maintain religious belief in the absence of empirical evidence. However, they also unwittingly illustrated the primacy of belief over rationality in their failure to apply this reasoning to their preferred religious belief, atheism. As they noted, evidence of belief in deities and an afterlife dates back at least 70,000 years. Far from being comforting, however, the anthropological record suggests that those beliefs were an oppressive system for enforcing cultural mores through irrational fear of powerful gods and the uncertainly of a terrifying afterlife. Tribal people throughout Asia, Africa, the Americas, and the Pacific feared punishment from the gods or spirits of the dead.

To free humans from that fear and oppression, the Greek philosopher Epicurus promulgated a contrary religious belief, atheism, based on the materialism of Democritus. Lucretius described Epicurus as a benefactor of humanity who freed us from fear of gods

and an afterlife by reassuring us of benign annihilation at death. Wishful thinking and intolerance of ambiguity led the Greeks to embrace materialism and atheism, which reduced nature to comfortingly inanimate chemical reactions.

Embracing either theism or atheism in the absence of empirical evidence is equally the result of our fear of ambiguity and uncertainty and is an emotional rather than rational choice.

Bruce Greyson
Carlson Prof. of Psychiatry and Neurobehavioral Sciences
Director, Division of Perceptual Studies
University of Virginia Health System
Charlottesville, Virginia

"Brain Science, God Science" leaves me, ahem, skeptical. The authors suggest that religion is inevitable because it has necessary stress-reducing properties. But some features of a pseudoscientific approach appear in the development of the theory, which is not presented as what it is: speculation about a vaguely defined question. Positive statements ("like it or not, the brain will continue to secrete religion as long as life generates problems") suggest a level of certainty inappropriate for this more or less "sitting-around-the-cider-barrel" discussion. The generality of the conclusion is in no way supported by the loose connections made among seeing familiar faces at services, oxytocin, "the factor of predictability," and the persistence of religious belief. Scientific élan is added with liberal discussion of brain physiology, hormones, and archaeological data, none of which can be tied to the premise by any experimental results.

In fact, it could be argued that religious belief and its attendant practice are often causes of stress, as when there are persecutions or a particular cult or sect makes unusual demands on its followers—a concept that the article fails to address. I wish the authors had adopted a lighter tone.

Paul Bedard
Port Huron, Michigan

While the authors tried to hit the subject ball out of the park, I would call it only a double. First of all, they seem to believe that the brain instinctively creates God or an equivalent. This is close to Dean Hamer's concept of a "God Gene." However, he admits that some of the most spiritual people he interviewed didn't believe in a deity at all. As a psychologist and the author of a book on evolutionary psychology, I think McGuire and Tiger have missed the point on what our brain does. We have evolved a symbolic brain that produces symbolic models to understand ourselves and the world we live in . . . now and thousands of years ago. Evolution has seen fit to tie our beliefs to our emotions and our emotions to our bodily functions. That's why the placebo and nocebo effects influenced our health even before modern medicine arrived. This was just as important as lessening our anxiety. Religion certainly played and still plays an important role in our lives since medicine can't control death and our models are not sufficient to understand it. But we keep trying!

Herman Kagan
Ventura, California

I found the article "Brain Science, God Science" by Michael McGuire and Lionel Tiger fascinating.

The part that I question is the statement, "a god or some equivalent is a product of the normal human brain." I can only infer from this that my brain is not "normal." I suppose I can take solace in the fact that nearly 94 percent of those who do the heavy lifting in the brains department, the National Academy of Sciences, are also missing a normal brain. Perhaps a study of these "abnormal" brains and why they function as they do might be productive.

Charlie Sitzes
Bloomington, Indiana

The May/June 2010 SKEPTICAL INQUIRER discusses the pervasiveness of belief in a god. This should not surprise us. Generations ago, Kurt Gödel used mathematical symbols to demonstrate that every coherent system of statements relies on at least one unprovable assumption.

Moreover, for us rational humans to make sense of the world, we need to make that assumption—it is a requirement. The religious among us call that assumption "God."

Geoffrey Milos
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Michael McGuire and Lionel Tiger respond:

We are grateful for the thoughtful, often angular, and always appropriate responses to our article. In fairness, the zest and variety of comments compel a reply longer than the original, which it is not our place to try to produce here.

However, it is precisely this range and intensity that provide us a sense of justification for the approach we took in "Brain Science, God Science." This approach was to suggest a way of understanding an array of religious and religious-like behavior grounded in new neurophysiological data and the possible interpretations these data may support.

The answers proposed will never cause contented stillness in the chapel or evaporation of the chapels themselves. But at least there may be a sturdier-than-ever factual basis for approaching such a massive and influential matter as what people and societies conclude about the limits of reality, the geography of mortality, and what the organic brain does amid all this. It's neither easy nor necessary to take sides in favor of one or another facet of an intricate prism, and we didn't want to do that. However, sacred buildings and stories and their doubtful and irritated critics all exist and even co-exist colorfully, often with massive impact. Of this we sought to be accountants, not judges.

Comets and Mammoths

I wish to expand on David Morrison's excellent special report (SI, May/June 2010) on the widely publicized claim that a huge broken-up comet collided with Earth just 13,000 years ago, wiping out mammoths, Clovis culture, and so on. As he explains, this poorly supported, speculative scenario is built upon an earlier pseudoscientific trade book by the lead author of the original *Proceedings of the National Academy of Sciences* paper.

I wish to add that PBS televised, in spring 2009, an hour-long episode of NOVA supporting this incredible hypothesis. Shockingly, this program has since been awarded the top prize for a TV science documentary by the American Association for the Advancement of Science (AAAS) at its annual meeting in February 2010. Mark Boslough, whose sidebar accompanies Morrison's article, appears on the NOVA program as the lone skeptic. Most of this flashy show touts the untenable arguments described by Morrison and purports to show that new evidence from Greenland supports the story.

The normal course of science didn't lead to Greenland. Instead, NOVA actually funded the expedition to Greenland, a questionable journalistic practice. I have seen a manuscript submitted to the AAAS journal, *Science*, which the authors hoped would be published simultaneously with the NOVA broadcast. Indeed, the NOVA producer coauthored the would-be *Science* paper, seemingly inconsis-

tent with requirements that coauthors actually are researchers. The article never appeared in *Science*, perhaps because it was submitted too late for the usual refereeing and publication processes to meet NOVA's broadcast schedule. Nor has the Greenland paper been published in *any* peer-reviewed scientific journal during the subsequent year.

It is a travesty that the AAAS has given this unpublished work such a prestigious award. Such august scientific institutions as NOVA, AAAS, and the National Academy have been drawn into a race to the bottom that has been a trend for some time on cable channels and other popular science media. It is sensational, controversial, and increasingly pseudoscientific topics that raise the ratings and readerships. Whether the hyped research is likely to be correct, was done by unimpeachable researchers, was critically evaluated before publication by other experts, and was actually published in a reputable journal all fall by the wayside.

Though I am a fellow of the AAAS, my complaint about a process that could make such an award was ignored until I insisted on an answer. The relevant AAAS official then replied that the award is made by strictly independent committees of scientists and journalists. The AAAS plays no role. Yet some entity must appoint the committees and establish criteria. As newspapers, magazines, and TV networks increasingly sideline many of the best science journalists in the nation, one wonders if enough remain to serve on such a committee.

I fear that we are entering a Dark Age in the reporting and communication of rational science, which bodes ill for scientific literacy of the next generation of Americans. This is not news to readers of SI, but the AAAS award to NOVA's portrayal of the putative Younger Dryas comet impact shows that the trend is accelerating and has penetrated some of the most respected institutions of science.

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I read with interest David Morrison's discussion of the YD impact hypothesis but did stumble a bit over one computation. In commenting on Richard Firestone's suggestion that the Carolina Bays formation might have been created by a Tunguska-like event, Morrison writes, "But calculation of average impact frequency suggested that only about one super-Tunguska could be expected to hit Earth in the past 13,000 years. The chance of two such extremely unlikely swarm impacts happening within the past few thousand years is worse than negligible."

If he meant, as it seems, that given that Tunguska indeed happened, the chance that another such event happened (to form the Carolina Bays) within geologically recent history is therefore *really* small, then I must take issue. Assuming that the impact probabilities in two different years are independent, the probability of two such events in a few thousand years is indeed very, very low, but the probability of two such events—given that one event (Tunguska) occurs in that period—is about the same as the unconditional probability of a single event. That is, Tunguska does not "protect" us from immediate future impacts.

Paul Hilfinger
Department of Electrical Engineering and Computer Sciences
University of California, Berkeley

David Morrison responds:

Clark Chapman's account of the AAAS prize given to a NOVA documentary that provided uncritical support for the speculative YD impact hypothesis is indeed disturbing. As for the NOVA show itself, it is consistent with a trend in all media to emphasize form over function, even when discussing scientific discoveries. Considered drama, the show was highly successful, illustrating science in action in the spectacular environment of the Greenland icecap. The scientists brave cold and potential danger to collect data, and when the lead scientist finds what he was looking for, he tears up on camera. In effect, this is "reality TV" brought to a science program. Such a documentary may well increase public interest in science and inspire students to seek science careers. The only thing wrong was the science itself, which was at best problematic and probably simply wrong.

Paul Hilfinger correctly criticizes my condensed discussion of impact probabilities. The point I intended to make was that a Tunguska-type event is seen on Earth only once every few centuries, and a super-Tunguska (large enough to form a shallow crater) is expected no more than once in the past 13,000 years. In contrast, these authors suggest one and perhaps two multiple impact events (the Carolina Bays and the YD impact), each of them involving tens of thousands of super-Tunguskas. Such huge swarms of super-Tunguska impacts are inconsistent with what astronomers know about our planet's cosmic environment or geologists' understanding of Earth's recent impact history. This is not just improbable; in common usage we would have to call it impossible.

A new twist on the YD impact story is a paper published in Geophysical Research Letters *by Andrew Scott and colleagues suggesting an alternative explanation for the tiny carbonaceous spherules that have been cited as evidence for the YD impact. Scott's team found that these spherules from the YD boundary are indistinguishable from lightly charred fungal sclerota and "fecal pellets, probably from termites." This hypothesis is described by Richard Kerr in* Science *(June 17, 2010) under the headline "Mammoth-Killer Nothing More Than Fungus and Bug Poop." Of course, this interpretation has not been independently verified, but it does appear in a peer-reviewed journal.*

When Scientists Change Their Minds

Regarding my short piece "When Scientists Actually Change Their Minds," accompanying David Morrison's special report on cosmic impacts and mammoths (SI, May/June 2010):

Another significant new development has caused Wallace Broecker to rethink his position . . . again. A recent paper in the journal *Nature* reports evidence for the late ice-age flood of meltwater he had postulated as the Younger Dryas trigger event. Broecker didn't see evidence when he flew over the area because he was looking in the wrong place. The floodwaters appear to have gone the opposite direction from what he had expected. Instead of pouring down the St. Lawrence River into the North Atlantic, the new evidence suggests that the flood followed the Mackenzie River into the Arctic. Broecker is quoted in a *Nature* news story as saying that the flood "would solve a big problem if it actually happened." The best scientists follow the evidence wherever it leads them, and sometimes it turns out to be back where they started.

Mark Boslough
Albuquerque, New Mexico

Winter of Our Discontent

Opening the May/June 2010 issue of SI, I was astounded to find the following statement concerning global warming in Kendrick Frazier's otherwise informative "From

the Editor" column: "Globally 2009 was . . . only a fraction of a percent cooler than the warmest year, 2005."

Expressing a temperature change as a percentage is of course completely without meaning—the value of the percentage change corresponding to a given temperature change will depend on the zero of the temperature scale in use (Celsius or Fahrenheit, for example). Self-styled global warming skeptics might legitimately point out that on the Kelvin scale of temperature (i.e., relative to *absolute* zero, the only really meaningful zero in such matters) the global change of some 0.6 degrees C over the last thirty to thirty-five years is itself only a fraction of a percent of 288 K, the mean temperature of the planet.

This is not a trivial distinction; it is fundamental to all informed understanding of climate change. On the very day I received the issue in question I came across Georg Hoffmann's demolition of Claude Allègre's *The Climate Imposture* on www.realclimate.org. In this book the former French minister demonstrates to his own satisfaction that anthropogenic global warming is hogwash. Among his numberless absurdities, Allègre ridicules the claim that in a certain period ". . . the global mean temperature rose by 0.6%."

Hoffmann politely lets this go as a typo; after all, Allègre may have meant the 0.6 degrees C figure mentioned above. True believers in the Big Bad Global Warming Conspiracy are not so polite and will not hesitate to jump on similar errors in publications like SI, especially in cases like this where the word *percent* was actually spelled out.

John Eades
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Kendrick Frazier responds:

Touché. I should have said fraction of a degree—although I picked up that "fraction of a percent" phrase from the text of a NASA podcast about data then just released by NASA's Goddard Institute for Space Studies, "2009 Global Temperature Package: Year Tied as Second Hottest," January 28, 2010.

Here, from an online paper at that same time, is how noted NASA-GISS climate scientist James Hansen and four colleagues put the matter:

> *Figure 1a shows 2009 as the second warmest year, but it is so close to 1998, 2002, 2003, 2006, and 2007 that we must declare these years as being in a virtual tie as the second warmest year. The maximum difference among these in the GISS analysis is ~0.03°C (2009 being the warmest among those years and 2006 the coolest). This range is approximately equal to our 1-sigma uncertainty of ~0.025°C, which is the reason for stating that these five years are tied for second warmest.*

By the way, data show that 2010 is well on its way to becoming even warmer than 2009 (and 1998 and any of those other years mentioned).

Bogus Bomb Detectors

The dowsing-rod–like bomb detectors used in Iraq and elsewhere (News and Comment, SI, May/June 2010) do work to a certain extent, or they did until they were "exposed." Remember, the horse Clever Hans really could correctly answer some arithmetical questions. You noted that the devices are "sensitive to the subconscious hand movements of the operator." Operators could be responding subconsciously to body-language cues of nervousness of those carrying bombs and fearful of detection. There is another possible mechanism: operators could be responding quite consciously and deliberately by pointing the device at those they believe to be carrying bombs, perhaps with good cause, and yet still fend off accusations of bias or profiling by attributing the response to the device. And a device costing tens of thousands of dollars is more believed in, and therefore works better, than a tree branch.

Howard J. Wilk
Philadelphia, Pennsylvania

Faith and the 9/11 Perpetrators

Much has been studied and said of September 11, including "Bill Maher: Crank and Comic" (SI, November/December 2009) and George Anhang's letter ("Maher's Ludicrous Comment," SI, May/June 2010).

Sam Harris firmly posits: "The men who committed the atrocities of September 11 were certainly not 'cowards,' as they were repeatedly described in the Western media, nor were they lunatics in any ordinary sense. They were men of faith—perfect faith, as it turns out—and this, it must finally be acknowledged, is a terrible thing to be" (*The End of Faith: Religion, Terror, and the Future of Reason*, 2004, p. 67).

David W. Alspaugh
Three Lakes, Wisconsin

The SKEPTICAL INQUIRER sometimes rewards us with articles that are then illustrated in a letter to the editor. In the May/June 2010 issue, Ilkka Pyysiäinen's article, "How Religion Resists the Challenge of Science," identifies three cultural biases that keep us believing. George Anhang's letter concerning "Maher's Ludicrous Comment" illustrates two of those three biases. Maher, referring to 9/11 and our retaliation, claimed lobbing missiles from 2,000 miles away was cowardly; staying in the plane as it hit the building was not. These are "un-American" sentiments and thus condemned by *conformist* bias. ABC cancelling Maher is a perfect case of "*punishing for fear of being punished for not punishing*." Stripped of "us versus them" context, Maher is correct. No courage is required to launch a missile. We do not praise Wernher von Braun's courage for raining V-2's on London. The whole purpose of Maher's show was to get us beyond the politically correct words to see the reality of the human condition. In this case he simply overstepped by skewering two cows that American *conformist bias* holds absolutely sacred: the evil of the 9/11 perpetrators and the bravery of all American troops, no matter what they might be doing.

Thanks to Ilkka Pyysiäinen we can see clearly the cultural mechanisms at work.

Robert D. Veitch
Minneapolis, Minnesota

Skeptical Inquirer
THE MAGAZINE FOR SCIENCE AND REASON

The letters column is a forum on matters raised in previous issues. **Letters should be no longer than 225 words.** Due to the volume of letters we receive, not all can be published. Send letters as e-mail text (not attachments) to letters@csicop.org. In the subject line, provide an informative identification, e.g.: "Letter on Jones evolution article." Include your name and address at the end of the letter. You may also mail your letter to the editor to 944 Deer Dr. NE, Albuquerque, NM 87122, or fax it to 505-828-2080.

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THE LAST LAUGH

BENJAMIN RADFORD, Editor

HIDDEN MESSAGES by Dave Thomas

The following letters are a simple substitution cipher. If R stands for L, it will do so everywhere. Solution is by trial and error. Hint: Look for patterns in words; for example, the scrambled phrase "JRXJ JRQ" might represent "THAT THE."

PUZZLE

"G NGKHFRKH HADKI CIDCOI ZAD VXDZ KD ZIOO ZAUH YDN ZUXHK HAIQ HD ND MIEURKI G XDHGEI GH UOZUBK EDGXEGNIK ZGHA HAIGF DZX NIKGFIK."

—KRKUX M. UXHADXB

CLUE: V = K

PREVIOUS PUZZLE SOLUTION (MAY/JUNE 2010): "I AM AGAINST RELIGION BECAUSE IT TEACHES US TO BE SATISFIED WITH NOT UNDERSTANDING THE WORLD."

— RICHARD DAWKINS

SUPER-SECRET WORD: Strangled (Instructions: www.nmsr.org/secretword.htm)

Hidden Messages Puzzle Contest

Submit your solution by e-mail to bradford@centerforinquiry.net or via postal mail to: Benjamin Radford, The Last Laugh, P.O. Box 3016, Corrales, NM 87048. Winner will be chosen at random from the first three correct submissions received by both e-mail and postal mail.

This issue's prize is a copy of the new Charles Darwin film *Creation*, starring Paul Bettany and Jennifer Connelly, now available on DVD from Lions Gate Films.

May/June 2010 Hidden Messages Puzzle Contest Winner: Steve Mattison

Famous Anniversaries in Skeptic History

Sixty-three Years Ago: The Modern UFO Craze Kicks In

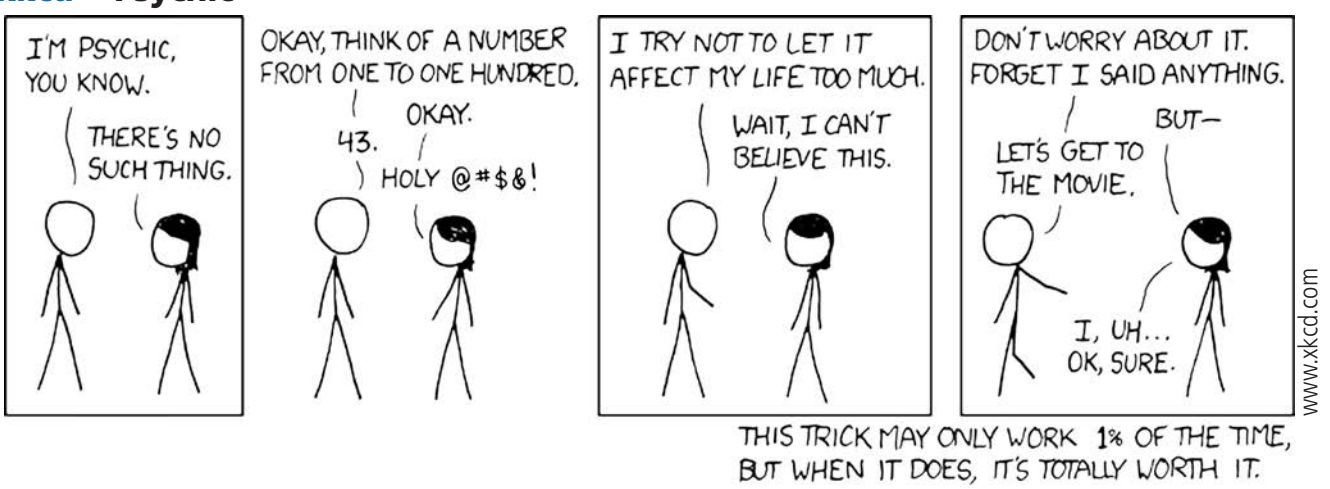
In Tacoma, Washington, during the summer of 1947, boaters Harold Dahl and Fred Crisman claim to have spotted a number of hovering doughnut-shaped UFOs, which drop metallic debris that kills Mr. Dahl's dog, damages his boat, and injures his son's arm. Luckily Mr. Dahl takes a picture of the spacecraft, but after an unpleasant and threatening encounter with some "men in black," Mr. Dahl reports that the photograph is useless because it shows too little "doughnut" and too much "hole." Mr. Dahl's son recovered nicely from his arm injuries.

A couple of days later, Kenneth Arnold claims to have observed several unexplained aircraft around Yakima, Washington, which he accurately and unequivocally describes as "saucer-shaped," "disk-shaped," "pie-pan shaped," "bat-shaped," "a pie plate" or "pie plate cut in half," "flat," "saucer-like," "flopping like fish," "crescent-shaped," and on and on to an impatient reporter who eventually condenses it to the now-famous "flying saucer" so he can squeeze the rambling story into his daily column.

Thirty-eight Years Ago: Therapeutic Touch Is Discovered Out of Thin Energy

In the early 1970s, nurse Dolores Krieger, along with professional theosophist Dora Kunz, discovers she can cure patients by using her energized, magical hands to manipulate her patients' "human energy field," which after thirty-seven years is still undetectable by the primitive instruments of modern science. After a few false starts, including the unfortunate roasting of a patient's liver, she eventually perfects the technique. Thanks to her first book *Therapeutic Touch: How to Use Your Hands to Help or to Heal or to Create Curative Shadow Puppets* and her perseverance, in combination with the public's insistence in its inalienable right "not to know," TT is now practiced in hundreds of hospitals, taught in many medical schools, and is effective against scores of conditions and illnesses caused by the obstruction of the free flow of the elusive energy field permeating the human body. – Paul DesOrmeaux

xkcd "Psychic"


I'M PSYCHIC, YOU KNOW.
THERE'S NO SUCH THING.
OKAY, THINK OF A NUMBER FROM ONE TO ONE HUNDRED.
OKAY.
43.
HOLY @#$&!
I TRY NOT TO LET IT AFFECT MY LIFE TOO MUCH.
WAIT, I CAN'T BELIEVE THIS.
DON'T WORRY ABOUT IT. FORGET I SAID ANYTHING.
BUT—
LET'S GET TO THE MOVIE.
I, UH... OK, SURE.
THIS TRICK MAY ONLY WORK 1% OF THE TIME, BUT WHEN IT DOES, IT'S TOTALLY WORTH IT.
www.xkcd.com

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PUERTO RICO. Sociedad De Escépticos de Puerto Rico, Luis R. Ramos, President. 2505 Parque Terra Linda, Trujillo Alto, Puerto Rico 00976. Tel: 787-396-2395; e-mail: Lramos@escepticospr.com; Web site www.escepticor.com.

The organizations listed above have aims similar to those of the Committee for Skeptical Inquiry but are independent and autonomous. Representatives of these organizations cannot speak on behalf of CSI. Please send updates to Barry Karr, P.O. Box 703, Amherst, New York 14226-0703.

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